1 SEQUENCE LISTING
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<120> Verform <120> Verfahren zur Herstellung von mehrfach ungsättigten Fettsäuren in transgenen Organismen

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		gtg Val														96
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		tct Ser														240
		cgg Arg														288
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		gtg Val			Gly											432
		att Ile														480

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		_	-	-	_			_			_	_	acc Thr	_		576	
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His Ser Gln Glu Ala Phe Asp Lys Leu Lys Arg Met Pro Lys Ile Asn 55

Pro Ser Ser Glu Leu Pro Pro Gln Ala Ala Val Asn Glu Ala Gln Glu 70

Asp Phe Arg Lys Leu Arg Glu Glu Leu Ile Ala Thr Gly Met Phe Asp

Ala Ser Pro Leu Trp Tyr Ser Tyr Lys Ile Ser Thr Thr Leu Gly Leu 105 100

Gly Val Leu Gly Tyr Phe Leu Met Val Gln Tyr Gln Met Tyr Phe Ile 125

Gly Ala Val Leu Leu Gly Met His Tyr Gln Gln Met Gly Trp Leu Ser

His Asp Ile Cys His His Gln Thr Phe Lys Asn Arg Asn Trp Asn Asn 145 155

Leu Val Gly Leu Val Phe Gly Asn Gly Leu Gln Gly Phe Ser Val Thr 170 165

Cys Trp Lys Asp Arg His Asn Ala His His Ser Ala Thr Asn Val Gln

Gly His Asp Pro Asp Ile Asp Asn Leu Pro Leu Leu Ala Trp Ser Glu 200

Asp Asp Val Thr Arg Ala Ser Pro Ile Ser Arg Lys Leu Ile Gln Phe 215

Gln Gln Tyr Tyr Phe Leu Val Ile Cys Ile Leu Leu Arg Phe Ile Trp 225 235 240

Суѕ	Pne	GIN	ser	245		Thr	Val	. Arg	Ser 250		. Lys	Asp	Arg	Asp 255		L		
Gln	Phe	Tyr	Arg 260		Gln	Tyr	Lys	Lys 265		. Ala	Ile	Gly	Leu 270		Leu			
His	Trp	Thr 275		Lys	Ala	Leu	Phe 280		Leu	Phe	Phe	Met 285		Ser	Ile			
Leu	Thr 290		Leu	Leu	Val	Phe 295		Val	Ser	Glu	Leu 300		Gly	Gly	Phe	:		
Gly 305	Ile	Ala	Ile	Val	Val 310	Phe	Met	Asn	His	Туг 315		Leu	Glu	Lys	Ile 320			
Gly	Asp	Ser	Val	Trp 325	Asp	Gly	His	Gly	Phe 330	Ser	Val	Gly	Gln	Ile 335		٠		
Glu	Thr	Met	Asn 340	Ile	Arg	Arg	Gly	Ile 345	Ile	Thr	Asp	Trp	Phe 350		Gly	٠.		
Gly	Leu	Asn 355	Tyr	Gln	Ile	Glu	His 360	His	Leu	Trp	Pro	Thr. 365		Pro	Arg			٠
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Leu	Leu	Arg	Tyr	Leu 405	Ala	Val	Phe	Ala	Arg 410	Met	Ala	Glu	Lys	Gln 415	Pro			
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gac Asp	ccg Pro	gaa Glu	atc Ile 20	ctc Leu	att Ile	ggc	acc Thr	ttc Phe 25	tcg Ser	tac Tyr	ttg Leu	cta Leu	ctc Leu 30	aaa Lys	ccg Pro		-	96

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agg Arg	gtc Val 130	tcc Ser	ttt Phe	ctc Leu	cag Gln	gcc Ala 135	ttc Phe	cac His	cac His	ttt Phe	ggc Gly 140	gcg Ala	ccg Pro	tgg Trp	gat Asp	432
gtg Val 145	tac Tyr	ctc Leu	Gly	att Ile	cgg Arg 150	ctg Leu	cac His	aac Asn	gag Glu	ggc Gly 155	gta Val	tgg Trp	atc Ile	ttc Phe	atg Met 160	480
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acc Thr	gcc Ala	gcc Ala	ggg Gly 180	Tyr	aag Lys	ttc	aag Lys	gcc Ala 185	aag Lys	ccg Pro	ctc Leu	atc Ile	acc Thr 190	gcg Ala	atg Met	576
cag Gln	atc Ile	tgc Cys 195	Gln	ttc Phe	gtg Val	ggc Gly	ggc Gly 200	Phe	ctg Leu	ttg Leu	gtc Val	tgg Trp 205	Asp	tac Tyr	atc Ile	624
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ttc Phe 225	Asn	tat Tyr	gca Ala	tac Tyr	gtc Val 230	Gly	tcg Ser	gtc Val	ttc Phe	ttg Leu 235	Leu	tto Phe	tgc Cys	cac His	ttt Phe 240	720
ttc Phe	tac Tyr	cag Gln	gac Asp	aac Asn 245	Leu	gca Ala	acg Thr	aag Lys	aaa Lys 250	Ser	gcc Ala	aag Lys	gcg Ala	ggc Gly 255	aag Lys	768
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Thr Ser Met Ile Trp Tyr Asn Val Leu Leu Ala Leu Phe Ser Ala Leu 50 55 60

Ser Phe Tyr Val Thr Ala Thr Ala Leu Gly Trp Asp Tyr Gly Thr Gly 65 70 75 80

Ala Trp Leu Arg Arg Gln Thr Gly Asp Thr Pro Gln Pro Leu Phe Gln 85 90 95

Cys Pro Ser Pro Val Trp Asp Ser Lys Leu Phe Thr Trp Thr Ala Lys
100 105 110

Ala Phe Tyr Tyr Ser Lys Tyr Val Glu Tyr Leu Asp Thr Ala Trp Leu 115 120 125

Arg Val Ser Phe Leu Gln Ala Phe His His Phe Gly Ala Pro Trp Asp 130 135 140

Val Tyr Leu Gly Ile Arg Leu His Asn Glu Gly Val Trp Ile Phe Met 145 150 155 160

Phe Phe Asn Ser Phe Ile His Thr Ile Met Tyr Thr Tyr Tyr Gly Leu 165 170 175

Thr Ala Ala Gly Tyr Lys Phe Lys Ala Lys Pro Leu Ile Thr Ala Met 180 185 190

Gln Ile Cys Gln Phe Val Gly Gly Phe Leu Leu Val Trp Asp Tyr Ile 195 200 205

Asn Val Pro Cys Phe Asn Ser Asp Lys Gly Lys Leu Phe Ser Trp Ala 210 215 220

Phe Asn Tyr Ala Tyr Val Gly Ser Val Phe Leu Leu Phe Cys His Phe 225 230 235 240

Phe Tyr Gln Asp Asn Leu Ala Thr Lys Lys Ser Ala Lys Ala Gly Lys
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Gln Leu

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gcg Ala	aag Lys	cac His	aat Asn 20	gct Ala	gct Ala	acc Thr	ata Ile	tcg Ser 25 ·	acg Thr	cag Gln	gaa Glu	cgc Arg	ctt Leu 30	tgc Cys	agt Ser	96
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gac Asp	cto Leu 50	caa Gln	tca Ser	ttc Phe	gat Asp	cat His 55	ccc Pro	eja aaa	ggt Gly	gaa Glu	acg Thr 60	atc Ile	aaa Lys	atg Met	ttt Phe	192
ggt Gly 65	Gl)	aac / Asn	gat Asp	gtc Val	act Thr 70	gta Val	cag Gln	tac Tyr	aag Lys	atg Met 75	att Ile	cac His	ccg Pro	tac Tyr	cat His 80	240
acc Thr	gag Glu	g aag 1 Lys	cat His	ttg Leu 85	gaa Glu	aag Lys	atg Met	aag. Lys	cgt Arg 90	gtc Val	ggc Gly	aag Lys	gtg Val	acg Thr 95	gat Asp	288
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gga Gly	tg: Tr:	g tto p Phe D	Phe	Arg	Ala	ttt Phe 135	Суѕ	Tyr	Ile	Ala	att Ile 140	ttc Phe	ttc Phe	tac Tyr	ctg Leu	432
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cac His	tg Tr 21	g aco p Thi	c cac c His	cac His	gct Ala	tac Tyr 215	Thr	aat Asn	cac His	gcc	gag Glu 220	Met	gat Asp	cco Pro	gat Asp	672

	Phe							cta Leu			ązA					720
								cgc Arg								768
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ctt Leu	gac Asp	ctc Leu 275	cag Gln	caa Gln	cgc Arg	ggc ggc	gca Ala 280	ctt Leu	tcc Ser	gtc Val	ggt Gly	atc Ile 285	cgt Arg	ctc Leu	gac Asp	864
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gga Gly 385	ttc Phe	ctt Leu	tcc Ser	ggt	tgc Cys 390	ttc Phe	acg Thr	gga Gly	ggt Gly	ctc Leu 395	aac Asn	ttt Phe	cag Gln	gtt Val	gaa Glu 400	1200
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ccc Pro	aag Lys	gtc Val	cgc Arg 420	gaa Glu	att Ile	tgc Cys	gcc Ala	aaa Lys 425	cac His	Gly	gtc Val	cac His	tac Tyr 430	gcc Ala	tac Tyr	1296
								ctc Leu								1344
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Leu Ser Ser Leu Lys Gly Glu Glu Val Cys Ile Asp Gly Ile Ile Tyr 35 40 45

Asp Leu Gln Ser Phe Asp His Pro Gly Gly Glu Thr Ile Lys Met Phe 50 55 60

Gly Gly Asn Asp Val Thr Val Gln Tyr Lys Met Ile His Pro Tyr His 65 70 75 80

Thr Glu Lys His Leu Glu Lys Met Lys Arg Val Gly Lys Val Thr Asp 85 90 95

Phe Val Cys Glu Tyr Lys Phe Asp Thr Glu Phe Glu Arg Glu Ile Lys

Arg Glu Val Phe Lys Ile Val Arg Arg Gly Lys Asp Phe Gly Thr Leu 115 120 125

Gly Trp Phe Phe Arg Ala Phe Cys Tyr Ile Ala Ile Phe Phe Tyr Leu 130 135 140

Gln Tyr His Trp Val Thr Thr Gly Thr Ser Trp Leu Leu Ala Val Ala 145 150 155 160

Tyr Gly Ile Ser Gln Ala Met Ile Gly Met Asn Val Gln His Asp Ala 165 170 175

Asn His Gly Ala Thr Ser Lys Arg Pro Trp Val Asn Asp Met Leu Gly 180 185 190

Leu Gly Ala Asp Phe Ile Gly Gly Ser Lys Trp Leu Trp Gln Glu Gln 195 200 205

His Trp Thr His His Ala Tyr Thr Asn His Ala Glu Met Asp Pro Asp 210 215 220

Ser Phe Gly Ala Glu Pro Met Leu Leu Phe Asn Asp Tyr Pro Leu Asp 225 230 235

His Pro Ala Arg Thr Trp Leu His Arg Phe Gln Ala Phe Phe Tyr Met 245 250 255

Pro Val Leu Ala Gly Tyr Trp Leu Ser Ala Val Phe Asn Pro Gln Ile 260 265 270

Leu Asp Leu Gln Gln Arg Gly Ala Leu Ser Val Gly Ile Arg Leu Asp 275 280 285

Asn Ala Phe Ile His Ser Arg Arg Lys Tyr Ala Val Phe Trp Arg Ala 290 295 300

Val Tyr Ile Ala Val Asn Val Ile Ala Pro Phe Tyr Thr Asn Ser Gly 310 315 320

Leu Glu Trp Ser Trp Arg Val Phe Gly Asn Ile Met Leu Met Gly Val
325 330 330

Ala Glu Ser Leu Ala Leu Ala Val Leu Phe Ser Leu Ser His Asn Phe 340 345 350

Glu Ser Ala Asp Arg Asp Pro Thr Ala Pro Leu Lys Lys Thr Gly Glu 355 360 365

Pro Val Asp Trp Phe Lys Thr Gln Val Glu Thr Ser Cys Thr Tyr Gly 370 375 380

Gly Phe Leu Ser Gly Cys Phe Thr Gly Gly Leu Asn Phe Gln Val Glu 385 390 395 400

His His Leu Phe Pro Arg Met Ser Ser Ala Trp Tyr Pro Tyr Ile Ala 405 410 415

Pro Lys Val Arg Glu Ile Cys Ala Lys His Gly Val His Tyr Ala Tyr 420 425 430

Tyr Pro Trp Ile His Gln Asn Phe Leu Ser Thr Val Arg Tyr Met His 435 440 445

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1				5	2++	asc.	cat	act	atc	cta	aga	tca	cat	cca	gg	t	96
Gly	Lys	Trp	Cys 20	Gln	Ile	Asp	Asp	A1a 25	Vai	Den	ALG	Der	30		-	•	144
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tac Tyr	: att	arg	aaa J Lys	a att	ctt Leu	gaa Glu 135	Thi	a ato	tto Phe	aca Thr	att 110	: nec	ttt i Phe	gc: Ala	a t a P	tc he	432
tac Ty:	c Let	caa ı Glı	a tao	c cad	c aca s Thi	с Туз	tai	t cti r Lei	cca 1 Pro	a tca Ser 155	HIC	att a Ile	cta e Lev	a at ı Me		ga 1y .60	480
gt: Va	t gc	g tgg a Trj	g ca o Gl	a ca n Gl: 16	n Le	g gga	a tg: y Tr:	g tta p Le	a ato u Ilo 17	c cat e His O	gaa Gli	a tto u Pho	c gca e Ala	a ca a Hi 17		at Iis	528
ca Gl:	g tt n Le	g tt u Ph	c aa e Ly 18	s As	c ag n Ar	a ta g Ty:	c ta r Ty	c aa r As 18	n As	t ttg p Le	g gc	c ag a Se	c ta r Ty 19		c g le 7	gtt Val	576
GJ āā	a aa y As	c tt n Ph 19	e Le	a ca u Gl	a gg n Gl	a tt y Ph	c tc e Se 20	r Se	t gg r Gl	t gg y Gl	t tg y Tr	g aa p Ly 20	5 61	g ca u Gl	ig (cac His	624
aa As	t gt n Va 21	.1 Hi	t ca s Hi	c gc .s Al	a gc a Al	c ac a Th 21	r As	it gt in Va	t gt 1 Va	t gg 1 Gl	a cg y Ar 22	g As	p Gl	a ga y As	at sp	ctt Leu	672
ga As 22	p Le	a gt u Va	c co	a tt	c ta ne Ty 23	X Al	t ac .a Th	a gt ir Va	g go il Al	a ga .a G1 23	u ni	t ct .s Le	c aa u As	ic aa sn As		tat Tyr 240	720
to Se	et ca	ig ga In As	at to sp So	er Ti	gg gt cp Va 45	ct at al Me	g ac et Ti	et et nr Le	eu Pi	c ag ne Ar 50	a to g Tr	gg ca	a ca ln Hi		tt al 55	cat His	768
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cga Arg	aat Asn	att Ile 435	Ala	aat Asn	gtt Val	gct Ala	gct Ala 440	Lys	ttg Leu	act Thr	aaa Lys	aag Lys 445	att Ile	gcc Ala	tag	1344
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Gly	Ser	Ala 35	Ile	Thr	Thr		Lys 40	Asn	Met	Asp	Ala	Thr 45	Thr	Val	Phe	
His	Thr 50	Phe	His	Thr	Gly	Ser 55	Lys	Glu	Ala	Tyr	Gln 60	Trp	Leu	Thr	Glu	

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 - 200 Asn Val His His Ala Ala Thr Asn Val Val Gly Arg Asp Gly Asp Leu
 - Asp Leu Val Pro Phe Tyr Ala Thr Val Ala Glu His Leu Asn Asn Tyr 225 230 235
 - Ser Gln Asp Ser Trp Val Met Thr Leu Phe Arg Trp Gln His Val His 245
 - Trp Thr Phe Met Leu Pro Phe Leu Arg Leu Ser Trp Leu Leu Gln Ser 265
 - Ile Ile Phe Val Ser Gln Met Pro Thr His Tyr Tyr Asp Tyr Tyr Arg 280
 - Asn Thr Ala Ile Tyr Glu Gln Val Gly Leu Ser Leu His Trp Ala Trp 300
 - Ser Leu Gly Gln Leu Tyr Phe Leu Pro Asp Trp Ser Thr Arg Ile Met . 315
 - Phe Phe Leu Val Ser His Leu Val Gly Gly Phe Leu Leu Ser His Val 325

	Thr	Phe	Asn 340	His	Tyr	Ser	Val	Glu 345	Lys	Phe	Ala	Leu	Ser 350	Ser	Asn		
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Ile 385	Glu	His	His	Leu	Phe 390	Pro	Thr	Met	Pro	Arg 395	His	Asn	Leu	Asn	Thr 400		
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		Tyr	ttg Leu												agt Ser		432
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gat Asp 225	cta Leu	gtc Val	gga Gly	gcc Ala	agt Ser 230	agc Ser	ttc Phe	atg Met	tgg Trp	aga Arg 235	cag Gln	caa Gln	cac His	gtt Val	gtg Val 240		720
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gtg Val	aaa Lys	gat Asp	cca Pro 260	gat Asp	gtc Val	agg Arg	agg Arg	gtt Val 265	gcg Ala	acc Thr	aca Thr	caa Gln	cca Pro 270	aga Arg	caa Gln		816
tgg Trp	tat Tyr	cat His 275	gcg Ala	tat Tyr	cag Gln	cat His	atc Ile 280	tac Tyr	ctg Leu	gca Ala	gta Val	tta Leu 285	tat Tyr	gga Gly	act Thr		864
			aag Lys														912
gga Gly 305	tca Ser	att Ile	Gly ggc	cct Pro	gtc Val 310	aag Lys	gtg Val	gcg Ala	aaa Lys	atg Met 315	acc Thr	ccc Pro	ctg Leu	gag Glu	ttc Phe 320		960
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			gtg Val 340													1	.056
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caa Gln	gta Val 370	gca Ala	cat His	gtc Val	gtg Val	gat Asp 375	gat Asp	gtt Val	gca Ala	ttt Phe	cct Pro 380	aca Thr	cca Pro	gaa Glu	ggt Gly	1	152

Gly 385												gca Ala			acg Thr 400	•	1200
												tct Ser					1248
		Gln		Glu								tgc Cys					1296
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		Leu		5				•	10			Gln		15			
Leu	Arg	Leu	Arg 20	5 Thr	Ser	Asn	Ser	Lys 25	10	Pro	Glu	-	Glu 30	15 Gln	Thr		
Leu Leu	Arg Lys	Leu Lys 35	Arg 20 Tyr	5 Thr Thr	Ser	Asn Glu	Ser Asp 40	Lys 25 Val	10 Gly Ser	Pro Arg	Glu His	Gln Asn 45	Glu 30 Thr	15 Gln Pro	Thr		
Leu Leu Asp	Arg Lys Cys 50	Leu Lys 35	Arg 20 Tyr Leu	5 Thr Thr Val	Ser Leu Ile	Asn Glu Trp 55	Ser Asp 40	Lys 25 Val Lys	10 Gly Ser Val	Pro Arg Tyr	Glu His Asp 60	Gln Asn 45	Glu 30 Thr	15 Gln Pro Ser	Thr Ala		
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Asn Lys Ile Asn Pro Gln Ile His Pro His Met Ile Leu Lys Ser Leu 145 150 155 160

Phe Ile Leu Gly Gly Tyr Phe Ala Ser Tyr Tyr Leu Ala Phe Phe Trp 165 170 175

Ser Ser Ser Val Leu Val Ser Leu Phe Phe Ala Leu Trp Met Gly Phe . 180 185 190

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Ser Tyr Thr Lys Trp Arg Gly Phe Gly Tyr Ile Met Gly Ala Ser Leu 210 215 220

Asp Leu Val Gly Ala Ser Ser Phe Met Trp Arg Gln Gln His Val Val 225 230 235 240

Gly His His Ser Phe Thr Asn Val Asp Asn Tyr Asp Pro Asp Ile Arg 245 250 255

Val Lys Asp Pro Asp Val Arg Arg Val Ala Thr Thr Gln Pro Arg Gln 260 265 270

Trp Tyr His Ala Tyr Gln His Ile Tyr Leu Ala Val Leu Tyr Gly Thr 275 280 285

Leu Ala Leu Lys Ser Ile Phe Leu Asp Asp Phe Leu Ala Tyr Phe Thr 290 295 300

Gly Ser Ile Gly Pro Val Lys Val Ala Lys Met Thr Pro Leu Glu Phe 305 310 315

Asn Ile Phe Phe Gln Gly Lys Leu Leu Tyr Ala Phe Tyr Met Phe Val 325 330 335

Leu Pro Ser Val Tyr Gly Val His Ser Gly Gly Thr Phe Leu Ala Leu 340 345 350

Tyr Val Ala Ser Gln Leu Ile Thr Gly Trp Met Leu Ala Phe Leu Phe 355 360 365

Gln Val Ala His Val Val Asp Asp Val Ala Phe Pro Thr Pro Glu Gly 370 375 380

Gly Lys Val Lys Gly Gly Trp Ala Ala Met Gln Val Ala Thr Thr 385 390 395 400

Asp Phe Ser Pro Arg Ser Trp Phe Trp Gly His Val Ser Gly Gly Leu 405 410 415

Asn	Asn	Gln	Ile 420		His	His	Leu	Phe 425	Pro	Gly	Val	Суѕ	His 430		His		
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Val	Pro 450		Val	Ala	Tyr	Pro 455		Phe	Trp	Thr	Ala 460	Leu	Arg	Ala	His		
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						aag Lys											240
			Ala			gtg Val									cag Gln		288
						acg Thr											336
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Arg	gtc Val 130	gtg Val	gag Glu	atc Ile	gtg _, Val	gcg Ala 135	ctc Leu	ttc Phe	gcg Ala	ctc Leu	tcg Ser 140	ttc Phe	tgg Trp	ctc Leu	atg Met		432
tcc Ser	aag Lys	gcc Ala	tcg Ser	ccc Pro	acc Thr	tcg Ser	ctc Leu	gtg Val	ctg Leu	ggc Gly	gtg Val	gtg Val	atg Met	aac Asn	ggc Gly		480

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Ile Ala Gln Gly Arg		al Met His Glu Met G	ly His Gly
165		170	175
tcg ttc acg ggc gtc	. Ile Trp Leu A	ac gac cgg atg tgc g	ag ttc ttc 576
Ser Phe Thr Gly Val		.sp Asp Arg Met Cys G	lu Phe Phe
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agc aag cac cac gcc Ser Lys His His Ala 210	geg eee aae e Ala Pro Asn A 215	gc ctc gag cac gat c arg Leu Glu His Asp V 220	rtc gat ctc 672 Val Asp Leu
aac acg ctg ccc ctg	g gtc gcc ttt a	aac gag cgc gtc gtg c	egc aag gtc 720
Asn Thr Leu Pro Leu	1 Val Ala Phe A	Asn Glu Arg Val Val 2	Arg Lys Val
225	230	235	240
aag ccg gga tcg ctg	ı Leu Ala Leu T	egg ctg cgc gtg cag g	gcg tac ctc 768
Lys Pro Gly Ser Lev		Prp Leu Arg Val Gln 2	Ala Tyr Leu
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Phe Ala Pro Val Ser		Ile Gly Leu Gly Trp ?	Thr Leu Tyr
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ggc tac tcg ccg gg	c acc tcg gtc g	ggg atg tac ctg tgc	tcg ttc ggc 960
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Leu Gly Cys Ile Ty		Gln Phe Ala Val Ser	His Thr His
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Leu Pro Val Thr As		Gln Leu His Trp Leu	Glu Tyr Ala
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tgg atg tcg aac ct Trp Met Ser Asn Le 370	g aac ttt cag u Asn Phe Gln 375	atc gag cac cac ctc Ile Glu His His Leu 380	ttc ccc acg 1152 Phe Pro Thr
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Ala Pro Gln Phe Ar	rg Phe Lys Glu	Ile Ser Pro Arg Val	Glu Ala Leu
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Phe Lys Arg His As	c ctc ccg tac n Leu Pro Tyr	tac gac ctg ccc tac Tyr Asp Leu Pro Tyr 410	acg agc gcg 1248 Thr Ser Ala 415
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Leu Thr Glu Gly Glu Ala Gly Val Asp Ala Thr Gln Ala Tyr Arg Glu 50 55 60

Phe His Gln Arg Ser Gly Lys Ala Asp Lys Tyr Leu Lys Ser Leu Pro 65 70 75 80

Lys Leu Asp Ala Ser Lys Val Glu Ser Arg Phe Ser Ala Lys Glu Gln 85 90 95

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100 105 110

Leu Val Ala Glu Gly Tyr Phe Asp Pro Ser Ile Pro His Met Ile Tyr 115 120 125

Arg Val Val Glu Ile Val Ala Leu Phe Ala Leu Ser Phe Trp Leu Met 130 - 135 140

Ser Lys Ala Ser Pro Thr Ser Leu Val Leu Gly Val Val Met Asn Gly 145 150 155 160

Ile Ala Gln Gly Arg Cys Gly Trp Val Met His Glu Met Gly His Gly 165 170 175

Ser Phe Thr Gly Val Ile Trp Leu Asp Asp Arg Met Cys Glu Phe Phe 180 185 190

Tyr Gly Val Gly Cys Gly Met Ser Gly His Tyr Trp Lys Asn Gln His 195 200 205

Ser Lys His His Ala Ala Pro Asn Arg Leu Glu His Asp Val Asp Leu 210 215 220

Asn Thr Leu Pro Leu Val Ala Phe Asn Glu Arg Val Val Arg Lys Val 225 230 235

Lys Pro Gly Ser Leu Leu Ala Leu Trp Leu Arg Val Gln Ala Tyr Leu 250

Phe Ala Pro Val Ser Cys Leu Leu Ile Gly Leu Gly Trp Thr Leu Tyr 265

Leu His Pro Arg Tyr Met Leu Arg Thr Lys Arg His Met Glu Phe Val 275 280

Trp Ile Phe Ala Arg Tyr Ile Gly Trp Phe Ser Leu Met Gly Ala Leu 290 295

Gly Tyr Ser Pro Gly Thr Ser Val Gly Met Tyr Leu Cys Ser Phe Gly

Leu Gly Cys Ile Tyr Ile Phe Leu Gln Phe Ala Val Ser His Thr His 325 330

Leu Pro Val Thr Asn Pro Glu Asp Gln Leu His Trp Leu Glu Tyr Ala

Ala Asp His Thr Val Asn Ile Ser Thr Lys Ser Trp Leu Val Thr Trp

Trp Met Ser Asn Leu Asn Phe Gln Ile Glu His His Leu Phe Pro Thr

Ala Pro Gln Phe Arg Phe Lys Glu Ile Ser Pro Arg Val Glu Ala Leu 385 395 390

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								ttc Phe								٠.	288
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								tgg Trp									384
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								cag Gln								•	816

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att gtt ccc ctg (Ile Val Pro Leu (305	cag tat ctg ccc Gln Tyr Leu Pro 310	ctg ggc aag gtg c Leu Gly Lys Val I 315	etg ctc ttg ttc Leu Leu Phe 320	960
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gat tac gca cac Asp Tyr Ala His 370	gat tcg cac ctc Asp Ser His Leu 375	tgg acc agc atc a Trp Thr Ser Ile 3	act ggc agc ttg Thr Gly Ser Leu	1152
aac tac cag gct Asn Tyr Gln Ala 385	gtg cac cat ctg Val His His Leu 390	ttc ccc aac gtg Phe Pro Asn Val	tcg cag cac cat Ser Gln His His 400	1200
tat ccc gat att Tyr Pro Asp Ile	ctg gcc atc atc Leu Ala Ile Ile 405	aag aac acc tgc Lys Asn Thr Cys 410	agc gag tac aag Ser Glu Tyr Lys 415	1248
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His Asn Thr Lys	: Asp Asp Leu Le	u Leu Ala Ile Arg 25	Gly Arg Val Tyr 30	
Asp Val Thr Lys	Phe Leu Ser Ar 40	g His Pro Gly Gly	Val Asp Thr Leu 45	
Leu Leu Gly Ala 50	a Gly Arg Asp Va 55	l Thr Pro Val Phe 60	Glu Met Tyr His	

Ala Phe Gly Ala Ala Asp Ala Ile Met Lys Lys Tyr Tyr Val Gly Thr 65 70 75 80

Leu Val Ser Asn Glu Leu Pro Ile Phe Pro Glu Pro Thr Val Phe His
85 90 95

Lys Thr Ile Lys Thr Arg Val Glu Gly Tyr Phe Thr Asp Arg Asn Ile 100 105 110

Asp Pro Lys Asn Arg Pro Glu Ile Trp Gly Arg Tyr Ala Leu Ile Phe 115 120 125

Gly Ser Leu Ile Ala Ser Tyr Tyr Ala Gln Leu Phe Val Pro Phe Val 130 135 140

Val Glu Arg Thr Trp Leu Gln Val Val Phe Ala Ile Ile Met Gly Phe 145 150 155 160

Ala Cys Ala Gln Val Gly Leu Asn Pro Leu His Asp Ala Ser His Phe 165 170 175

Ser Val Thr His Asn Pro Thr Val Trp Lys Ile Leu Gly Ala Thr His 180 185 190

Asp Phe Phe Asn Gly Ala Ser Tyr Leu Val Trp Met Tyr Gln His Met 195 200 205

Leu Gly His His Pro Tyr Thr Asn Ile Ala Gly Ala Asp Pro Asp Val 210 225

Ser Thr Ser Glu Pro Asp Val Arg Ile Lys Pro Asn Gln Lys Trp 225 230 235 240

Phe Val Asn His Ile Asn Gln His Met Phe Val Pro Phe Leu Tyr Gly 245 250 255

Leu Leu Ala Phe Lys Val Arg Ile Gln Asp Ile Asn Ile Leu Tyr Phe 260 265 270

Val Lys Thr Asn Asp Ala Ile Arg Val Asn Pro Ile Ser Thr Trp His 275 280 285

Thr Val Met Phe Trp Gly Gly Lys Ala Phe Phe Val Trp Tyr Arg Leu 290 295 300

Ile Val Pro Leu Gl
n Tyr Leu Pro Leu Gly Lys Val Leu Leu Leu Phe 305 310 315 320

Thr Val Ala Asp Met Val Ser Ser Tyr Trp Leu Ala Leu Thr Phe Gln 325 330 335

Ala Asn His Val Val Glu Val Gln Trp Pro Leu Pro Asp Glu Asn 340 345 350	
Gly Ile Ile Gln Lys Asp Trp Ala Ala Met Gln Val Glu Thr Thr Gln 365	
Asp Tyr Ala His Asp Ser His Leu Trp Thr Ser Ile Thr Gly Ser Leu 370 375 380	
Asn Tyr Gln Ala Val His His Leu Phe Pro Asn Val Ser Gln His His 385 390 395 400	
Tyr Pro Asp Ile Leu Ala Ile Ile Lys Asn Thr Cys Ser Glu Tyr Lys 405 410 415	
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ggt agt gca att act acc tat aaa aat atg gat gcc act acc gta ttc Gly Ser Ala Ile Thr Thr Tyr Lys Asn Met Asp Ala Thr Thr Val Phe 35 40	144
cac aca ttc cat act ggt tct aaa gaa gcg tat caa tgg ctg aca gaa His Thr Phe His Thr Gly Ser Lys Glu Ala Tyr Gln Trp Leu Thr Glu 50 55	192
ttg aaa aaa gag tgc cct aca caa gaa cca gag atc cca gat att aag Leu Lys Lys Glu Cys Pro Thr Gln Glu Pro Glu Ile Pro Asp Ile Lys 65 70 75 80	240
gat gac cca atc aaa gga att gat gat gtg aac atg gga act ttc aat Asp Asp Pro Ile Lys Gly Ile Asp Asp Val Asn Met Gly Thr Phe Asn 85 90 95	288
att tot gag aaa cga tot goo caa ata aat aaa agt tto act gat ota	

				100		-			105					110				
	cgt Arg	atg Met	cga Arg 115	gtt Val	cgt Arg	gca Ala	gaa Glu	gga Gly 120	ctt Leu	atg Met	gat Asp	gga Gly	tct Ser 125	cct Pro	ttg Leu	ttc Phe		384
	tac Tyr	att Ile 130	aga Arg	aaa Lys	att Ile	ctt Leu	gaa Glu 135	aca Thr	atc Ile	ttc Phe	aca Thr	att Ile 140	ctt Leu	ttt Phe	gca Ala	ttc Phe		432
	tac Tyr 145	ctt Leu	caa Gln	tac Tyr	cac His	aca Thr 150	tat Tyr	tat Tyr	ctt Leu	cca Pro	tca Ser 155	gct Ala	att Ile	cta Leu	atg Met	gga Gly 160		480
	gtt Val	gcg Ala	tgg Trp	caa Gln	caa Gln 165	ttg Leu	gga Gly	tgg Trp	tta Leu	atc Ile 170	cat His	gaa Glu	ttc Phe	gca Ala	cat His 175	cat His		528
	cag Gln	ttg Leu	ttc Phe	aaa Lys 180	aac Asn	aga Arg	tac Tyr	tac Tyr	aat Asn 185	gat Asp	ttg Leu	gcc Ala	agc Ser	tat Tyr 190	ttc Phe	gtt Val		576
	gga Gly	aac Asn	ttt Phe 195	tta Leu	caa Gln	gga Gly	ttc Phe	tca Ser 200	tct Ser	ggt Gly	ggt Gly	tgg Trp	aaa Lys 205	gag Glu	cag Gln	cac His	٠.	624
	aat Asn	gtg Val 210	cat His	cac His	gca Ala	gcc Ala	aca Thr 215	aat Asn	gtt Val	gtt Val	gga Gly	cga Arg 220	gac Asp	gga Gly	gat Asp	ctt Leu		672
	gat Asp 225	tta Leu	gtc Val	cca Pro	ttc Phe	tat Tyr 230	gct Ala	aca Thr	gtg Val	gca Ala	gaa Glu 235	cat His	ctc Leu	aac Asn	aat Asn	tat Tyr 240	•	720
	tct Ser	cag Gln	gat Asp	tca Ser	tgg Trp 245	gtt Val	atg Met	act Thr	cta Leu	ttc Phe 250	aga Arg	tgg Trp	caa Gln	cat His	gtt Val 255	cat His	•	768
•	tgg Trp	aca Thr	ttc Phe	atg Met 260	tta Leu	cca Pro	ttc Phe	ctc Leu	cgt Arg 265	ctc Leu	tcg Ser	tgg Trp	ctt Leu	ctt Leu 270	Gln	tca Ser		816
	atc Ile	att Ile	ttt Phe 275	gtt Val	agt Ser	cag Gln	atg Met	cca Pro 280	act Thr	cat His	tat Tyr	tat Tyr	gac Asp 285	tat Tyr	tac Tyr	aga Arg		864
	aat Asn	act Thr 290	Ala	att Ile	tat Tyr	gaa Glu	cag Gln 295	Val	Gly	ctc Leu	tct Ser	ttg Leu 300	His	tgg Trp	gct Ala	tgg Trp		912
	tca Ser 305	Leu	ggt Gly	caa Gln	ttg Leu	tat Tyr 310	Phe	cta Leu	ccc Pro	gat Asp	tgg Trp 315	Ser	act Thr	aga Arg	ata Ile	atg Met 320	•	960
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	gtt Val	act Thr	ttc Phe	aat Asn 340	His	tat Tyr	tca Ser	gtg Val	gag Glu 345	Lys	ttt Phe	gca Ala	ttg Leu	agc Ser 350	Ser	aac Asn		1056
	atc Ile	atg Met	tca Ser 355	Asn	tac Tyr	gct Ala	tgt Cys	Leu 360	Gln	atc Ile	atg Met	acc Thr	aca Thr 365	Arg	aat Asn	atg Met	·	1104
	aga Arg	. cct	gga Gly	aga Arg	ttc Phe	att Ile	gac Asp	tgg Trp	ctt Leu	tgg Trp	gga Gly	ggt Gly	ctt Leu	aac Asn	tat Tyr	cag Gln		1152

375 370 1200 att gag cac cat ctt ttc cca acg atg cca cga cac aac ttg aac act Ile Glu His His Leu Phe Pro Thr Met Pro Arg His Asn Leu Asn Thr 395 390 gtt atg cca ctt gtt aag gag ttt gca gca gca aat ggt tta cca tac 1248 Val Met Pro Leu Val Lys Glu Phe Ala Ala Ala Asn Gly Leu Pro Tyr 405 atg gtc gac gat tat ttc aca gga ttc tgg ctt gaa att gag caa ttc 1296 Met Val Asp Asp Tyr Phe Thr Gly Phe Trp Leu Glu Ile Glu Gln Phe 420 425 cga aat att gca aat gtt gct gct aaa ttg act aaa aag att gcc tag 1344 Arg Asn Ile Ala Asn Val Ala Ala Lys Leu Thr Lys Lys Ile Ala <210> 16 <211> 447 <212> PRT <213> Caenorhabditis elegans Met Val Leu Arg Glu Gln Glu His Glu Pro Phe Phe Ile Lys Ile Asp . 5 Gly Lys Trp Cys Gln Ile Asp Asp Ala Val Leu Arg Ser His Pro Gly Gly Ser Ala Ile Thr Thr Tyr Lys Asn Met Asp Ala Thr Thr Val Phe 40 His Thr Phe His Thr Gly Ser Lys Glu Ala Tyr Gln Trp Leu Thr Glu 60 Leu Lys Lys Glu Cys Pro Thr Gln Glu Pro Glu Ile Pro Asp Ile Lys 70 Asp Asp Pro Ile Lys Gly Ile Asp Asp Val Asn Met Gly Thr Phe Asn 85 Ile Ser Glu Lys Arg Ser Ala Gln Ile Asn Lys Ser Phe Thr Asp Leu 105 100 Arg Met Arg Val Arg Ala Glu Gly Leu Met Asp Gly Ser Pro Leu Phe 125 120 Tyr Ile Arg Lys Ile Leu Glu Thr Ile Phe Thr Ile Leu Phe Ala Phe 140 Tyr Leu Gln Tyr His Thr Tyr Tyr Leu Pro Ser Ala Ile Leu Met Gly 155 150 Val Ala Trp Gln Gln Leu Gly Trp Leu Ile His Glu Phe Ala His His

170

Gln Leu Phe Lys Asn Arg Tyr Tyr Asn Asp Leu Ala Ser Tyr Phe Val 180 185 190

Gly Asn Phe Leu Gln Gly Phe Ser Ser Gly Gly Trp Lys Glu Gln His 195 200 205

Asn Val His His Ala Ala Thr Asn Val Val Gly Arg Asp Gly Asp Leu 210 215 220

Asp Leu Val Pro Phe Tyr Ala Thr Val Ala Glu His Leu Asn Asn Tyr 225 230 235 240

Ser Gln Asp Ser Trp Val Met Thr Leu Phe Arg Trp Gln His Val His 245 250 255

Trp Thr Phe Met Leu Pro Phe Leu Arg Leu Ser Trp Leu Leu Gln Ser 260 265 270

Ile Ile Phe Val Ser Gln Met Pro Thr His Tyr Tyr Asp Tyr Tyr Arg 275 280 285

Asn Thr Ala Ile Tyr Glu Gln Val Gly Leu Ser Leu His Trp Ala Trp 290 295 300

Ser Leu Gly Gln Leu Tyr Phe Leu Pro Asp Trp Ser Thr Arg Ile Met 305 310 315 320

Phe Phe Leu Val Ser His Leu Val Gly Gly Phe Leu Leu Ser His Val 325 330 335

Val Thr Phe Asn His Tyr Ser Val Glu Lys Phe Ala Leu Ser Ser Asn 340 345 350

Ile Met Ser Asn Tyr Ala Cys Leu Gln Ile Met Thr Thr Arg Asn Met 355 360 365

Arg Pro Gly Arg Phe Ile Asp Trp Leu Trp Gly Gly Leu Asn Tyr Gln 370 380

Ile Glu His His Leu Phe Pro Thr Met Pro Arg His Asn Leu Asn Thr 385 390 395 400

Val Met Pro Leu Val Lys Glu Phe Ala Ala Ala Asn Gly Leu Pro Tyr 405 410 415

Met Val Asp Asp Tyr Phe Thr Gly Phe Trp Leu Glu Ile Glu Gln Phe 420 425 430

Arg Asn Ile Ala Asn Val Ala Ala Lys Leu Thr Lys Lys Ile Ala
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440
445

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gat cta tgg atc tcg att caa ggg aaa gcc tat gat gtt tcg gat tgg Asp Leu Trp Ile Ser Ile Gln Gly Lys Ala Tyr Asp Val Ser Asp Trp 25	152
gtg aaa gac cat cca ggt ggc agc ttt ccc ttg aag agt ctt gct ggt Val Lys Asp His Pro Gly Gly Ser Phe Pro Leu Lys Ser Leu Ala Gly 40 45	200
Caa gag gta act gat gca ttt gtt gca ttc cat cct gcc tct aca tgg Gln Glu Val Thr Asp Ala Phe Val Ala Phe His Pro Ala Ser Thr Trp 55 60 65	248
aag aat ctt gat aag ttt ttc act ggg tat tat ctt aaa gat tac tct Lys Asn Leu Asp Lys Phe Phe Thr Gly Tyr Tyr Leu Lys Asp Tyr Ser 70 85	296
gtt tct gag gtt tct aaa gat tat agg aag ctt gtg ttt gag ttt tct Val Ser Glu Val Ser Lys Asp Tyr Arg Lys Leu Val Phe Glu Phe Ser 90 95	344
aaa atg ggt ttg tat gac aaa aaa ggt cat att atg ttt gca act ttg Lys Met Gly Leu Tyr Asp Lys Lys Gly His Ile Met Phe Ala Thr Leu 105 110 115	392
tgc ttt ata gca atg ctg ttt gct atg agt gtt tat ggg gtt ttg ttt Cys Phe Ile Ala Met Leu Phe Ala Met Ser Val Tyr Gly Val Leu Phe 120 125 130	.440
tgt gag ggt gtt ttg gta cat ttg ttt tct ggg tgt ttg atg ggg ttt Cys Glu Gly Val Leu Val His Leu Phe Ser Gly Cys Leu Met Gly Phe 135 140 145	488
ctt tgg att cag agt ggt tgg att gga cat gat gct ggg cat tat atg Leu Trp Ile Gln Ser Gly Trp Ile Gly His Asp Ala Gly His Tyr Met 150 155 160 165	536
gta gtg tct gat tca agg ctt aat aag ttt atg ggt att ttt gct gca Val Val Ser Asp Ser Arg Leu Asn Lys Phe Met Gly Ile Phe Ala Ala 170 175 180	584
aat tgt ctt tca gga ata agt att ggt tgg tgg aaa tgg aac cat aat Asn Cys Leu Ser Gly Ile Ser Ile Gly Trp Trp Lys Trp Asn His Asn 185 190 195	632
gca cat cac att gcc tgt aat agc ctt gaa tat gac cct gat tta caa Ala His His Ile Ala Cys Asn Ser Leu Glu Tyr Asp Pro Asp Leu Gln	680

	200		20	5				210				
		ctt gtt Leu Val										728
		gag aaa Glu Lys 235										776
ttt gta Phe Val	_							_	_	_	_	824
agg ctc Arg Leu												872
aat gtg Asn Val				u Leu								920
att tgg Ile Trp 295												968
att atg Ile Met 310												1016
cag ttc Gln Phe	_				_	-		-		_		1064
aaa ggg												1112
tct tgt Ser Cys				p Phe								1160
att gag (Ile Glu) 375												1208
atc tcg (Ile Ser 1 390												1256
aat tat q Asn Tyr	Ala Ser				~	_			-		_	1304
agg aac a Arg Asn '					Ile							1352
aat ttg g Asn Leu V				s Thr				aatt	accc	tt		1398
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gaggttttg	gc tttca	tctcc at	tättgai	g aat	aagg	agt	tgca	tatt	gt c	aatt	gttgt	1578

gctcaatatc tgatattttg gaatgtactt tgtaccactg tgttttcagt tgaagctcat 1683 gtgtacttct atagactttg tttaaatggt tatgtcatgt tattt

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<213> Borago officinalis

<400> 18

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His Asp Lys Pro Gly Asp Leu Trp Ile Ser Ile Gln Gly Lys Ala Tyr

Asp Val Ser Asp Trp Val Lys Asp His Pro Gly Gly Ser Phe Pro Leu 40

Lys Ser Leu Ala Gly Gln Glu Val Thr Asp Ala Phe Val Ala Phe His

Pro Ala Ser Thr Trp Lys Asn Leu Asp Lys Phe Phe Thr Gly Tyr Tyr 70

Leu Lys Asp Tyr Ser Val Ser Glu Val Ser Lys Asp Tyr Arg Lys Leu

Val Phe Glu Phe Ser Lys Met Gly Leu Tyr Asp Lys Lys Gly His Ile 105 100

Met Phe Ala Thr Leu Cys Phe Ile Ala Met Leu Phe Ala Met Ser Val 120

Tyr Gly Val Leu Phe Cys Glu Gly Val Leu Val His Leu Phe Ser Gly 135

Cys Leu Met Gly Phe Leu Trp Ile Gln Ser Gly Trp Ile Gly His Asp 150 . 155 145

Ala Gly His Tyr Met Val Val Ser Asp Ser Arg Leu Asn Lys Phe Met

Gly Ile Phe Ala Ala Asn Cys Leu Ser Gly Ile Ser Ile Gly Trp Trp 185 180

Lys Trp Asn His Asn Ala His His Ile Ala Cys Asn Ser Leu Glu Tyr 200

Asp Pro Asp Leu Gln Tyr Ile Pro Phe Leu Val Val Ser Ser Lys Phe 215

Phe Gly Ser Leu Thr Ser His Phe Tyr Glu Lys Arg Leu Thr Phe Asp 230 . 235

Ser Leu Ser Arg Phe Phe Val Ser Tyr Gln His Trp Thr Phe Tyr Pro 250

Ile Met Cys Ala Ala Arg Leu Asn Met Tyr Val Gln Ser Leu Ile Met 265 270

Leu Leu Thr Lys Arg Asn Val Ser Tyr Arg Ala Gln Glu Leu Leu Gly 275 280 285

Cys Leu Val Phe Ser Ile Trp Tyr Pro Leu Leu Val Ser Cys Leu Pro 295

Asn Trp Gly Glu Arg Ile Met Phe Val Ile Ala Ser Leu Ser Val Thr

Gly Met Gln Gln Val Gln Phe Ser Leu Asn His Phe Ser Ser Val 325 330 335

Tyr Val Gly Lys Pro Lys Gly Asn Asn Trp Phe Glu Lys Gln Thr Asp 345 350

Gly Thr Leu Asp Ile Ser Cys Pro Pro Trp Met Asp Trp Phe His Gly 355 360

Gly Leu Gln Phe Gln Ile Glu His His Leu Phe Pro Lys Met Pro Arg . 370 375

Cys Asn Leu Arg Lys Ile Ser Pro Tyr Val Ile Glu Leu Cys Lys Lys 385 390 395

His Asn Leu Pro Tyr Asn Tyr Ala Ser Phe Ser Lys Ala Asn Glu Met 405

Thr Leu Arg Thr Leu Arg Asn Thr Ala Leu Gln Ala Arg Asp Ile Thr 425

Lys Pro Leu Pro Lys Asn Leu Val Trp Glu Ala Leu His Thr His Gly 440

<210> 19

<211> 1563

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att Ile	gac Asp	gtt Val	gag Glu 20	cac His	ttg Leu	gca Ala	acg Thr	atg Met 25	ccc Pro	ctc Leu	gtc Val	agt Ser	gac Asp 30	ttc Phe	cta Leu	96
aat Asn	gtc Val	ctg Leu 35	gga Gly	acg Thr	act Thr	ttg Leu	ggc Gly 40	cag Gln	tgg Trp	agt Ser	ctt Leu	tcc Ser 45	act Thr	aca Thr	ttc Phe	144
gct Ala	ttc Phe 50	aag Lys	agg Arg	ctc Leu	acg Thr	act Thr 55	aag Lys	aaa Lys	cac His	agt Ser	tcg Ser 60	gac Asp	atc Ile	tcg Ser	gtg Val	192
gag Glu 65	gca Ala	caa Gln	aaa Lys	gaa Glu	tcg Ser 70	gtt Val	gcg Ala	cgg Arg	GJA aaa	cca Pro 75	gtt Val	gag Glu	aat Asn	att Ile	tct Ser 80	240
caa Gln	tcg Ser	gtt Val	gcg Ala	cag Gln 85	ccc Pro	atc Ile	agg Arg	cgg Arg	agg Arg 90	tgg Trp	gtg Val	cag Gln	gat Asp	aaa Lys 95	aag Lys	288
Pro	Val	Thr	Tyr 100	Ser	Leu	Lys	Asp	Val 105	Ala	Ser	cac His	Asp	Met 110	Pro	Gin	336
Asp	Cys	Trp 115	Ile	Ile	Ile	Lys	Glu 120	Lys	Val	Tyr		125	Ser	Thr	Pne .	384
Ala	Glu 130	Gln	His	Pro	Gly	Gly 135	Thr	· Val	Ile	Asn	acc Thr 140	Tyr	Pne	GTĀ	Arg	432
gac Asp 145	Ala	aca Thr	gat Asp	gtt Val	ttc Phe 150	Ser	act	ttc Phe	cac His	gca Ala 155	tcc Ser	acc Thr	tca Ser	tgg Trp	aag Lys 160	480
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Leu	Glu	Leu	180	Lys	Glu	Туг	Arg	185	Leu	Arg	, Ala	Leu	Phe 190	. Leu	aga Arg	576
Glu	Gln	195	Phe	. Lys	Ser	Ser	Lys 200	s Ser)	Tyr	Туг	. Leu	205	E Lys	Thr	ctc Leu	624
Ile	Asr 210	val	L Ser	: Ile	e Val	. Ala 215	Thi	r Sex	: Ile	e Ala	220	e Il∈	e Ser	: Lev	tac Tyr	672
aag Lys 225	Ser	tac Ty	c Arg	g gcg g Ala	gtt a Val 230	Let	tta Lei	a tca ı Sei	e gco	agt Ser 235	r Leu	g ato 1 Met	GJ GG GG GG GG GG GG GG GG GG GG GG GG G	tto Lev	ttt Phe 240	720
att Ile	caa e Glr	a cag	g tgo n Cys	gga Gl ₃ 24	y Trr	y ttg Del	tc:	t cad	gat s Asp 250	Phe	t cta e Lev	a cad	c cat s His	cag Glr 255	g gta n Val	768
tt! Phe	gag Glu	g aca	a cgo r Arg 260	g Tr	g cto o Lev	c aat 1 Asi	ga n As	c gt p Va 26	l Val	t ggd 1 Gl	c tat y Tyi	gte Va	g gto 1 Va: 270	L Gly	aac Asn	816

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					agt Ser										ctg Leu		864
					aat Asn												912
	_		_		ctc Leu 310				-		_		_		_		960
					aag Lys											;	1008
			_	_	ctt Leu	_	_		_			_			ttt Phe	•	1056
	_		_		act Thr					_					_	:	1104
					acg Thr												1152
					ctc Leu 390												1200
					tct Ser											:	1248
					gag Glu											:	L296
gcc Ala	cag Gln	att Ile 435	gca Ala	tcg Ser	act Thr	cgc Arg	gac Asp 440	atc Ile	aaa Lys	gca Ala	GJÀ āāā	gtg Val 445	ttt Phe	aat Asn	gat Asp		1344
tgg Trp	ttc Phe 450	acc Thr	gga Gly	ggt Gly	ctc Leu	aac Asn 455	aga Arg	cag Gln	att Ile	gag Glu	cat His 460	cat His	cta Leu	ttt Phe	cca Pro	•	1392
					aac Asn 470											:	1440
ttg Leu	tgc Cys	aag Lys	aag Lys	cat His 485	gga Gly	ctg Leu	Val	tac Tyr	gaa Glu 490	gac Asp	gtg Val	agc Ser	atg Met	gct Ala 495	tcg Ser		L488
ggc Gly	act Thr	tac Tyr	cgg Arg 500	gtt Val	ttg Leu	aaa Lys	aca Thr	ctt Leu 505	aag Lys	gac Asp	gtt Val	gcc Ala	gat Asp 510	gct Ala	gct Ala		L536
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<400> 20

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Asn Val Leu Gly Thr Thr Leu Gly Gln Trp Ser Leu Ser Thr Thr Phe 35 40 45

Ala Phe Lys Arg Leu Thr Thr Lys Lys His Ser Ser Asp Ile Ser Val 50 60

Glu Ala Gln Lys Glu Ser Val Ala Arg Gly Pro Val Glu Asn Ile Ser 65 70 75 80

Gln Ser Val Ala Gln Pro Ile Arg Arg Trp Val Gln Asp Lys Lys 85 90 95

Pro Val Thr Tyr Ser Leu Lys Asp Val Ala Ser His Asp Met Pro Gln 100 105 110

Asp Cys Trp Ile Ile Lys Glu Lys Val Tyr Asp Val Ser Thr Phe 115 120 125

Ala Glu Gln His Pro Gly Gly Thr Val Ile Asn Thr Tyr Phe Gly Arg 130 135 140

Asp Ala Thr Asp Val Phe Ser Thr Phe His Ala Ser Thr Ser Trp Lys 145 150 155 160

Ile Leu Gln Asn Phe Tyr Ile Gly Asn Leu Val Arg Glu Glu Pro Thr 165 170 175

Leu Glu Leu Leu Lys Glu Tyr Arg Glu Leu Arg Ala Leu Phe Leu Arg 180 185 190

Glu Gln Leu Phe Lys Ser Ser Lys Ser Tyr Tyr Leu Phe Lys Thr Leu 195 200 205

'Ile Asn Val Ser Ile Val Ala Thr Ser Ile Ala Ile Ile Ser Leu Tyr 210 220

Lys Ser Tyr Arg Ala Val Leu Leu Ser Ala Ser Leu Met Gly Leu Phe 225 230 235 240

Ile Gln Cys Gly Trp Leu Ser His Asp Phe Leu His His Gln Val 245 250 255

Phe Glu Thr Arg Trp Leu Asn Asp Val Val Gly Tyr Val Val Gly Asn 260 265 270

Val Val Leu Gly Phe Ser Val Ser Trp Trp Lys Thr Lys His Asn Leu 275 280 285

His His Ala Ala Pro Asn Glu Cys Asp Gln Lys Tyr Thr Pro Ile Asp 290 295 300

Glu Asp Ile Asp Thr Leu Pro Ile Ile Ala Trp Ser Lys Asp Leu Leu 305 310 315 320

Ala Thr Val Glu Ser Lys Thr Met Leu Arg Val Leu Gln Tyr Gln His 325 330 335

Leu Phe Phe Leu Val Leu Leu Thr Phe Ala Arg Ala Ser Trp Leu Phe 340 345 350

Trp Ser Ala Ala Phe Thr Leu Arg Pro Glu Leu Thr Leu Gly Glu Lys 355 360 365

Leu Leu Glu Arg Gly Thr Met Ala Leu His Tyr Ile Trp Phe Asn Ser

Val Ala Phe Tyr Leu Leu Pro Gly Trp Lys Pro Val Val Trp Met Val 385 390 395

Val Ser Glu Leu Met Ser Gly Phe Leu Leu Gly Tyr Val Phe Val Leu 405 410 415

Ser His Asn Gly Met Glu Val Tyr Asn Thr Ser Lys Asp Phe Val Asn 420 425 430

Ala Gln Ile Ala Ser Thr Arg Asp Ile Lys Ala Gly Val Phe Asn Asp 435 440 445

Trp Phe Thr Gly Gly Leu Asn Arg Gln Ile Glu His His Leu Phe Pro 450 460

Thr Met Pro Arg His Asn Leu Asn Lys Ile Ser Pro His Val Glu Thr 465 470 475 480

Leu Cys Lys Lys His Gly Leu Val Tyr Glu Asp Val Ser Met Ala Ser 485 490 495

Gly Thr Tyr Arg Val Leu Lys Thr Leu Lys Asp Val Ala Asp Ala Ala 500 505 510

Ser His Gln Gln Leu Ala Ala Ser

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cgc aag Arg Lys	: Ile	agt Ser 20	tgg Trp	cag Gln	gaa Glu	gtc Val	aag Lys 25	acc Thr	cac His	gcg Ala	tct Ser	ccg Pro 30	gag Glu	gac Asp		96
gcc tgg Ala Trp	atc Ile 35	att Ile	cac His	tcc Ser	aat Asn	aag Lys 40	gtc Val	tac Tyr	gac Asp	gtg Val	tcc Ser 45	aac Asn	tgg Trp	cac [,] His		144
gaa cat Glu His 50	ccc Pro	gga Gly	Gly ggc	gcc Ala	gtc Val 55	att Ile	ttc Phe	acg Thr	cac His	gcc Ala 60	ggt Gly	gac Asp	gac Asp	atg Met	•	192
acg gad Thr As <u>r</u> 65	att Ile	ttc Phe	gct Ala	gcc Ala 70	ttt Phe	cac His	gca Ala	ccc Pro	gga Gly 75	tcg Ser	cag Gln	tcg Ser	ctc Leu	atg Met 80	٠	240
aag aag Lys Lys	g ttc s Phe	tac Tyr	att Ile 85	ggc Gly	gaa Glu	ttg Leu	ctc Leu	ccg Pro 90	gaa Glu	acc Thr	acc Thr	Gly ggc	aag Lys 95	gag Glu		288
ccg caq Pro Gli	g caa n Gln	atc Ile 100	gcc Ala	ttt Phe	gaa Glu	aag Lys	ggc Gly 105	tac Tyr	cgc Arg	gat Asp	ctg Leu	cgc Arg 110	tcc Ser	aaa Lys		336
ctc ato Leu Ile	e atg e Met 115	atg Met	ggc. Gly	atg Met	ttc Phe	aag Lys 120	tcc Ser	aac Asn	aag Lys	tgg Trp	ttc Phe 125	tac Tyr	gtc Val	tac Tyr		384
aag tg Lys Cy: 13	s Leu	Ser	aac Asn	Met	Ala	Ile	Trp	Ala	Ala	gcc Ala 140	tgt Cys	gct Ala	ctc Leu	gtc Val		432
ttt tac Phe Ty: 145	c tcg r Ser	gac Asp	cgc Arg	ttc Phe 150	tgg Trp	gta Val	cac His	ctg Leu	gcc Ala 155	agc Ser	gcc Ala	gtc Val	atg Met	ctg Leu 160		480
gga ac	a ttc r Phe	ttt Phe	cag Gln 165	cag Gln	tcg Ser	gga Gly	tgg Trp	ttg Leu 170	gca Ala	cac His	gac Asp	ttt Phe	ctg Leu 175	cac His		528
cac ca His Gl	g gtc n Val	ttc Phe 180	acc Thr	aag Lys	cgc Arg	aag Lys	cac His 185	Gly	gat Asp	ctc Leu	GJA	gga Gly 190	ctc Leu	ttt Phe		576
tgg gg Trp Gl	g aac y Asn 195	ctc Leu	atg Met	cag Gln	ggt Gly	tac Tyr 200	Ser	gta Val	cag Gln	tgg Trp	tgg Trp 205	Lys	aac Asn	aag Lys		624
cac aa His As 21	n Gly	cac His	cac	gcc Ala	gtc Val 215	Pro	aac Asn	ctc Leu	cac His	tgc Cys 220	tcc Ser	tcc Ser	gca Ala	gtc Val		672

gcg Ala 225	Gln	gat Asp	Gly ggg	gac	ccg Pro 230	Asp	atc Ile	gat Asp	acc Thr	atg Met 235	Pro	ctt Leu	cto Lev	gcc Ala	tgg Trp 240	720
tcc Ser	gtc Val	cag Gln	caa Gln	gcc Ala 245	Gln	tct Ser	tac Tyr	cgg	gaa Glu 250	Leu	caa Gln	gcc Ala	gac Asp	gga Gly 255		768
gat Asp	tcg Ser	ggt	ttg Leu 260	Val	aag Lys	ttc Phe	atg Met	atc Ile 265	cgt Arg	aac Asn	caa Gln	tcc Ser	tac Tyr 270	Phe	tac Tyr	816
ttt Phe	Pro	Ile 275	ttg Leu	ttg Leu	ctc Leu	gcc Ala	cgc Arg 280	ctg Leu	tcg Ser	tgg Trp	ttg Leu	aac Asn 285	gag Glu	tcc Ser	ttc Phe	864
aag Lys	tgc Cys 290	gcc Ala	ttt Phe	GJA aaa	ctt Leu	gga Gly 295	gct Ala	gcg Ala	tcg Ser	gag Glu	aac Asn 300	Ala	gct Ala	ctc Leu	gaa Glu	912
ctc Leu 305	aag Lys	gcc Ala	aag Lys	ggt Gly	ctt Leu 310	cag Gln	tac Tyr	Pro	ctt Leu	ttg Leu 315	gaa Glu	aag Lys	gct Ala	Gly	atc Ile 320	960
ctg Leu	ctg Leu	cac His	tac Tyr	gct Ala 325	tgg Trp	atg Met	ctt Leu	aca Thr	gtt Val 330	tcg Ser	tcc Ser	ggc Gly	ttt Phe	gga Gly 335	cgc Arg	1008
ttc Phe	tcg Ser	ttc Phe	gcg Ala 340	tac Tyr	acc Thr	gca Ala	ttt Phe	tac Tyr 345	ttt Phe	cta Leu	acc Thr	gcg Ala	acc Thr 350	gcg Ala	tcc Ser	1056
tgt Cys	gga Gly	ttc Phe 355	ttg Leu	ctc Leu	gcc Ala	att Ile	gtc Val 360	ttt Phe	ggc Gly	ctc Leu	ggc Gly	cac His 365	aac Asn	ggc Gly	atg Met	1104
gcc Ala	acc Thr 370	tac Tyr	aat Asn	gcc Ala	gac Asp	gcc Ala 375	cgt Arg	ccg Pro	gac Asp	ttc Phe	tgg Trp 380	aag Lys	ctc Leu	caa Gln	gtc Val	1152
acc Thr 385	acg Thr	act Thr	cgc Arg	aac Asn	gtc Val 390	acg Thr	ggc Gly	gga Gly	cac His	ggt Gly 395	ttc Phe	ccc Pro	caa Gln	gcc Ala	ttt Phe 400	1200
gtc Val	gac Asp	tgg Trp	ttc Phe	tgt Cys 405	ggt Gly	ggc Gly	ctc Leu	cag Gln	tac Tyr 410	caa Gln	gtc Val	gac Asp	cac His	cac His 415		1248
ttc Phe	ccc Pro	agc Ser	ctg Leu 420	ccc Pro	cga Arg	cac His	aat Asn	ctg Leu 425	gcc Ala	aag Lys	aca Thr	cac His	gca Ala 430	ctg Leu	gtc Val	1296
gaa Glu	Ser	ttc Phe 435	tgc Cys	aag Lys	gag Glu	tgg Trp	ggt Gly 440	gtc Val	cag Gln	tac Tyr	cac His	gaa Glu 445	gcc Ala	gac Asp	ctt Leu	1344
gtg Val	gac Asp 450	G1A aaa	acc Thr	atg Met	Glu	gtc Val 455	ttg Leu	cac His	cat His	ttg Leu	ggc Gly 460	agc Ser	gtg Val	gcc Ala	Gly	1392
gaa Glu 465	ttc Phe	gtc Val	gtg Val	gat Asp	ttt Phe 470	gta Val	cgc Arg	gat Asp	Gly	ccc Pro 475	gcc Ala	atg Met	taa			1434

22 477 <210> <211> <212>

PRT

<213> Phaeodactylum tricornutum

<400> 22

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Ala Trp Ile Ile His Ser Asn Lys Val Tyr Asp Val Ser Asn Trp His 35 40 45

Glu His Pro Gly Gly Ala Val Ile Phe Thr His Ala Gly Asp Asp Met 50 55 60

Thr Asp Ile Phe Ala Ala Phe His Ala Pro Gly Ser Gln Ser Leu Met 65 70 75 80

Lys Lys Phe Tyr Ile Gly Glu Leu Leu Pro Glu Thr Thr Gly Lys Glu 85 90 95

Pro Gln Gln Ile Ala Phe Glu Lys Gly Tyr Arg Asp Leu Arg Ser Lys
100 105 110

Leu Ile Met Met Gly Met Phe Lys Ser Asn Lys Trp Phe Tyr Val Tyr 115 120 125

Lys Cys Leu Ser Asn Met Ala Ile Trp Ala Ala Ala Cys Ala Leu Val 130 140

Phe Tyr Ser Asp Arg Phe Trp Val His Leu Ala Ser Ala Val Met Leu 145 150 155

Gly Thr Phe Phe Gln Gln Ser Gly Trp Leu Ala His Asp Phe Leu His 165 170 175

His Gln Val Phe Thr Lys Arg Lys His Gly Asp Leu Gly Gly Leu Phe 180 185 . 190

Trp Gly Asn Leu Met Gln Gly Tyr Ser Val Gln Trp Trp Lys Asn Lys 195 200 205

His Asn Gly His His Ala Val Pro Asn Leu His Cys Ser Ser Ala Val 210 215 220

Ala Gln Asp Gly Asp Pro Asp Ile Asp Thr Met Pro Leu Leu Ala Trp 225 230 235 240

Ser Val Gln Gln Ala Gln Ser Tyr Arg Glu Leu Gln Ala Asp Gly Lys 245 250 255 Asp Ser Gly Leu Val Lys Phe Met Ile Arg Asn Gln Ser Tyr Phe Tyr 265

Phe Pro Ile Leu Leu Ala Arg Leu Ser Trp Leu Asn Glu Ser Phe 280

Lys Cys Ala Phe Gly Leu Gly Ala Ala Ser Glu Asn Ala Ala Leu Glu 295 300

Leu Lys Ala Lys Gly Leu Gln Tyr Pro Leu Leu Glu Lys Ala Gly Ile 305 310 315

Leu Leu His Tyr Ala Trp Met Leu Thr Val Ser Ser Gly Phe Gly Arg

Phe Ser Phe Ala Tyr Thr Ala Phe Tyr Phe Leu Thr Ala Thr Ala Ser

Cys Gly Phe Leu Leu Ala Ile Val Phe Gly Leu Gly His Asn Gly Met 360

Ala Thr Tyr Asn Ala Asp Ala Arg Pro Asp Phe Trp Lys Leu Gln Val 380

Thr Thr Arg Asn Val Thr Gly Gly His Gly Phe Pro Gln Ala Phe 390 395

Val Asp Trp Phe Cys Gly Gly Leu Gln Tyr Gln Val Asp His His Leu -410 405

Phe Pro Ser Leu Pro Arg His Asn Leu Ala Lys Thr His Ala Leu Val 420 425

Glu Ser Phe Cys Lys Glu Trp Gly Val Gln Tyr His Glu Ala Asp Leu

Val Asp Gly Thr Met Glu Val Leu His His Leu Gly Ser Val Ala Gly 455

Glu Phe Val Val Asp Phe Val Arg Asp Gly Pro Ala Met

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<213> Physcomitrella patens

<220>

<221> CDS

<222> (1)..(1578)

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atc Ile	gac Asp	gtc Val	gag Glu 20	cac His	att Ile	gcc Ala	agt Ser	atg Met 25	tct Ser	ctc Leu	ttc Phe	agc Ser	gac Asp 30	ttc Phe	ttc Phe	96
agt Ser	tat Tyr	gtg Val 35	tct Ser	tca Ser	act Thr	gtt Val	ggt Gly 40	tcg Ser	tgg Trp	agc Ser	gta Val	cac His 45	agt Ser	ata Ile	caa Gln	144
cct Pro	ttg Leu 50	aag Lys	cgc Arg	ctg Leu	acg Thr	agt Ser 55	aag Lys	aag Lys	cgt Arg	gtt Val	tcg Ser 60	gaa Glu	agc Ser	gct Ala	gcc Ala	192
gtg Val 65	caa Gln	tgt Cys	ata Ile	tca Ser	gct Ala 70	gaa Glu	gtt Val	cag Gln	aga Arg	aat Asn 75	tcg Ser	agt Ser	acc Thr	cag Gln	gga Gly 80	240
act Thr	gcg Ala	gag Glu	gca Ala	ctc Leu 85	gca Ala	gaa Glu	tca Ser	gtc Val	gtg Val 90	aag Lys	ccc Pro	acg Thr	aga Arg	cga Arg 95	agg Arg	288
tca Ser	tct Ser	cag Gln	tgg Trp 100	aag Lys	aag Lys	tcg Ser	aca Thr	cac His 105	ccc Pro	cta Leu	tca Ser	gaa Glu	gta Val 110	gca Ala	gta Val	336
cac His	aac Asn	aag Lys 115	cca Pro	agc Ser	gat Asp	tgc Cys	tgg Trp 120	att Ile	gtt Val	gta Val	Lys	aac Asn 125	aag Lys	gtg Val	tat Tyr	384
gat Asp	gtt Val 130	tcc Ser	aat Asn	ttt Phe	gcg Ala	gac Asp 135	gag Glu	cat His	ccc Pro	gga Gly	gga Gly 140	tca Ser	gtt Val	att Ile	agt Ser	432 .
act Thr 145	tat Tyr	ttt Phe	gga Gly	cga Arg	gac Asp 150	ggc	aca Thr	gat Asp	gtt Val	ttc Phe 155	tct Ser	agt Ser	ttt Phe	cat His	gca Ala 160	480
gct Ala	tct Ser	aca Thr	tgg Trp	aaa Lys 165	att Ile	ctt Leu	caa Gln	gac Asp	ttt Phe 170	tac Tyr	att Ile	ggt Gly	gac Asp	gtg Val 175	gag Glu	528
agg Arg	gtg Val	gag Glu	ccg Pro 180	act Thr	cca Pro	gag Glu	ctg Leu	ctg Leu 185	aaa Lys	gat Asp	ttc Phe	cga Arg	gaa Glu 190	atg Met	aga Arg	576
gct Ala	ctt Leu	ttc Phe 195	Leu	agg Arg	gag Glu	caa Gln	ctt Leu 200	ttc Phe	aaa Lys	agt Ser	tcg Ser	aaa Lys 205	ttg Leu	tac Tyr	tat Tyr	624
gtt Val	atg Met 210	Lys	ctg Leu	ctc Leu	acg Thr	aat Asn 215	gtt Val	gct Ala	att Ile	ttt Phe	gct Ala 220	gcg Ala	agc Ser	att Ile	gca Ala	672
ata Ile 225	Ile	tgt Cys	tgg Trp	agc Ser	aag Lys 230	Thr	att Ile	tca Ser	gcg Ala	gtt Val 235	Leu	gct Ala	tca Ser	gct Ala	tgt Cys 240	720
atg Met	atg Met	gct Ala	ctg Leu	tgt Cys 245	Phe	caa Gln	cag Gln	tgc Cys	gga Gly 250	Trp	cta Leu	tcc Ser	cat His	gat Asp 255	Phe	768
ctc Leu	cac His	aat Asn	cag Gln 260	Val	ttt Phe	gag Glu	aca Thr	cgc Arg 265	tgg Trp	ctt Leu	aat Asn	gaa Glu	gtt Val 270	Val	GJÅ aaa	816

tat Tyr	gtg Val	atc Ile 275	Gly	aac Asn	gcc Ala	gtt. Val	ctg Leu 280	Gly	ttt Phe	agt Ser	aca Thr	gg9 Gly 285	Trp	tgg Trp	aag Lys	864
gag	aag Lys 290	His	aac Asn	ctt Leu	cat His	cat His 295	Ala	gct Ala	cca Pro	aat Asn	gaa Glu 300	Cys	gat Asp	cag Gln	act Thr	912
tac Tyr 305	Gln	cca Pro	att Ile	gat Asp	gaa Glu 310	Asp	att	gat Asp	act Thr	ctc Leu 315	Pro	ctc	att	gcc Ala	tgg Trp 320	960
agc Ser	aag	gac	ata Ile	ctg Leu 325	Ala	aca Thr	gtt Val	gag Glu	aat Asn 330	aag Lys	aca Thr	ttc Phe	ttg Leu	cga Arg 335	atc Ile	1008
ctc Leu	caa Gln	tac Tyr	cag Gln 340	cat His	ctg Leu	ttc Phe	ttc Phe	atg Met 345	ggt Gly	ctg Leu	tta Leu	ttt Phe	ttc Phe 350	gcc Ala	cgt Arg	1056
											tct Ser					1104
tca Ser	Pro 370	Val	gac Asp	agg Arg	ttg Leu	ttg Leu 375	gag Glu	aag Lys	gga Gly	act Thr	gtt Val 380	ctg Leu	ttt Phe	cac His	tac Tyr	1152
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tta Leu	gta Val	tgg Trp	atg Met	gcg Ala 405	gtg Val	act Thr	gag Glu	ctc Leu	atg Met 410	tcc Ser	ggc Gly	atg Met	ctg Leu	ctg Leu 415	ggc Gly	1248
ttt Phe	gta Val	ttt Phe	gta Val 420	ctt Leu	agc Ser	cac His	aat Asn	ggg Gly 425	atg Met	gag Glu	gtt Val	tat Tyr	aat Asn 430	tcg Ser	tct Ser	1296
aaa Lys	gaa Glu	ttc Phe 435	gtg Val	agt Ser	gca Ala	cag Gln	atc Ile 440	gta Val	tcc Ser	aca Thr	cgg Arg	gat Asp 445	Ile	aaa Lys	gga Gly	1344
aac Asn	ata Ile 450	ttc Phe	aac Asn	gac Asp	tgg Trp	ttc Phe 455	act Thr	ggt Gly	Gly ggc	ctt Leu	aac Asn 460	agg Arg	caa Gln	ata Ile	gag Glu	1392
cat His 465	cat His	ctt Leu	ttc Phe	cca Pro	aca Thr 470	atg Met	ccc Pro	agg Arg	cat His	aat Asn 475	tta Leu	aac Asn	aaa Lys	ata Ile	gca Ala 480	1440
cct Pro	aga Arg	gtg Val	gag Glu	gtg Val 485	ttc Phe	tgt Cys	aag Lys	aaa Lys	cac His 490	ggt Gly	ctg Leu	gtg Val	tac Tyr	gaa Glu 495	gac Asp	1488
gta Val	tct Ser	att Ile	gct Ala 500	acc Thr	Gly	act Thr	Cys	aag Lys 505	gtt Val	ttg Leu	aaa Lys	Ala	ttg Leu 510	aag Lys	gaa Glu	1536
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<210> <211> <212> 24 525 PRT <213> Physcomitrella patens

<400> 24

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Ile Asp Val Glu His Ile Ala Ser Met Ser Leu Phe Ser Asp Phe Phe 20 25 30

Ser Tyr Val Ser Ser Thr Val Gly Ser Trp Ser Val His Ser Ile Gln 35 40 45

Pro Leu Lys Arg Leu Thr Ser Lys Lys Arg Val Ser Glu Ser Ala Ala 50 55 60

Val Gln Cys 1le Ser Ala Glu Val Gln Arg Asn Ser Ser Thr Gln Gly 65 70 75 80

Thr Ala Glu Ala Leu Ala Glu Ser Val Val Lys Pro Thr Arg Arg Arg 90 95

Ser Ser Gln Trp Lys Lys Ser Thr His Pro Leu Ser Glu Val Ala Val 100 105 110

His Asn Lys Pro Ser Asp Cys Trp Ile Val Val Lys Asn Lys Val Tyr
115 120 125

Asp Val Ser Asn Phe Ala Asp Glu His Pro Gly Gly Ser Val Ile Ser 130 135 140

Thr Tyr Phe Gly Arg Asp Gly Thr Asp Val Phe Ser Ser Phe His Ala 145 150 155 160

Ala Ser Thr Trp. Lys Ile Leu Gln Asp Phe Tyr Ile Gly Asp Val Glu 165 170 175

Arg Val Glu Pro Thr Pro Glu Leu Leu Lys Asp Phe Arg Glu Met Arg 180 185 190

Ala Leu Phe Leu Arg Glu Gln Leu Phe Lys Ser Ser Lys Leu Tyr Tyr 195 200 205

Val Met Lys Leu Thr Asn Val Ala Ile Phe Ala Ala Ser Ile Ala 210 215 220

Ile Ile Cys Trp Ser Lys Thr Ile Ser Ala Val Leu Ala Ser Ala Cys 225 230 235 240

Met Met Ala Leu Cys Phe Gln Gln Cys Gly Trp Leu Ser His Asp Phe

Leu His Asn Gln Val Phe Glu Thr Arg Trp Leu Asn Glu Val Val Gly 260 265 270

Tyr Val Ile Gly Asn Ala Val Leu Gly Phe Ser Thr Gly Trp Trp Lys 275 280 285

Glu Lys His Asn Leu His His Ala Ala Pro Asn Glu Cys Asp Gln Thr 290 295 300

Tyr Gln Pro Ile Asp Glu Asp Ile Asp Thr Leu Pro Leu Ile Ala Trp 305 310 315 320

Ser Lys Asp Ile Leu Ala Thr Val Glu Asn Lys Thr Phe Leu Arg Ile 325 330 335

Leu Gln Tyr Gln His Leu Phe Phe Met Gly Leu Leu Phe Phe Ala Arg 340 345 350

Gly Ser Trp Leu Phe Trp Ser Trp Arg Tyr Thr Ser Thr Ala Val Leu 355 360 365

Ser Pro Val Asp Arg Leu Leu Glu Lys Gly Thr Val Leu Phe His Tyr 370 375 380

Phe Trp Phe Val Gly Thr Ala Cys Tyr Leu Leu Pro Gly Trp Lys Pro 385 390 395 400

Leu Val Trp Met Ala Val Thr Glu Leu Met Ser Gly Met Leu Leu Gly
405 410 415

Phe Val Phe Val Leu Ser His Asn Gly Met Glu Val Tyr Asn Ser Ser 420 425 430

Lys Glu Phe Val Ser Ala Gln Ile Val Ser Thr Arg Asp Ile Lys Gly 435 440 445

Asn Ile Phe Asn Asp Trp Phe Thr Gly Gly Leu Asn Arg Gln Ile Glu 450 455 460

His His Leu Phe Pro Thr Met Pro Arg His Asn Leu Asn Lys Ile Ala 465 470 475 480

Pro Arg Val Glu Val Phe Cys Lys Lys His Gly Leu Val Tyr Glu Asp 485 490 495

Val Ser Ile Ala Thr Gly Thr Cys Lys Val Leu Lys Ala Leu Lys Glu 500 505

Val Ala Glu Ala Ala Glu Gln His Ala Thr Thr Ser 515 520 525

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	cac gga His Gly											240
	gac aaa Asp Lys											288
	gaa aag Glu Lys 100											336
Leu His	gat gat Asp Asp 115		Met L									384
	att tca Ile Ser		Ser I	le Met	Ala	Phe	Ala	Phe				432
tat ctt Tyr Leu 145	gga tgg Gly Trp	tat att Tyr Ile 150	act to	ct gca er Ala	tgt Cys	tta Leu 155	tta Leu	gca Ala	ctt Leu	gca Ala	tgg Trp 160	480
caa caa Gln Gln	ttc gga Phe Gly	tgg tta Trp Leu 165	aca c Thr H	at gag is Glu	ttc Phe 170	tgc Cys	cat His	caa Gln	cag Gln	cca Pro 175	aca Thr	528
_	aga cct Arg Pro 180	_	_			_						576
Leu Gln	gga ttt Gly Phe 195	Ser Arg	Asp T	rp Trp	Lys	Asp	Lys	His 205	Asn	Thr	His	624
	gcc aca Ala Thr											672

							-				-							
1	cca Pro 225	Ļeu	ttc Phe	gca Ala	ttt Phe	att Ile 230	cca Pro	gga Gly	gat Asp	ttg Leu	tgc Cys 235	aag Lys	tat Tyr	aag Lys	gcc Ala	agc Ser 240	. 7	20
	ttt Phe	gaa Glu	aaa Lys	gca Ala	att Ile 245	ctc Leu	aag Lys	att Ile	gta Val	cca Pro 250	tat Tyr	caa Gln	cat His	ctc Leu	tat Tyr 255	ttc Phe	7	768
1	acc Thr	gca Ala	atg Met	ctt Leu 260	cca Pro	atg Met	ctc Leu	cgt Arg	ttc Phe 265	tca Ser	tgg Trp	act Thr	ggt Gly	cag Gln 270	tca Ser	gtt Val	ε	316
	caa Gln	tgg Trp	gta Val 275	ttc Phe	aaa Lys	gag Glu	aat Asn	caa Gln 280	atg Met	gag Glu	tac Tyr	aag Lys	gtc Val 285	tat Tyr	caa Gln	aga Arg		364
	aat Asn	gca Ala 290	ttc Phe	tgg Trp	gag Glu	caa Gln	gca Ala 295	aca Thr	att Ile	gtt Val	gga Gly	cat His 300	tgg Trp	gct Ala	tgg Trp	gta Val	· ·	912
	ttc Phe 305	Tyr	caa Gln	ttg Leu	ttc Phe	tta Leu 310	tta Leu	cca Pro	aca Thr	tgg Trp	cca Pro 315	Leu	cgg Arg	gtt Val	gct Ala	tat Tyr 320	<u> </u>	960
	ttc Phe	att Ile	att Ile	tca Ser	caa Gln 325	atg Met	gga Gly	gga Gly	ggc Gly	ctt Leu 330	ttg Leu	att Ile	gct Ala	cac His	gta Val 335	gtc Val	1(800
	act Thr	ttc Phe	aac Asn	cat His 340	Asn	tct Ser	gtt Val	gat Asp	aag Lys 345	tat Tyr	cca Pro	gcc Ala	aat Asn	tct Ser 350	cga Arg	att	10	056
	tta Leu	aac Asn	aac Asn 355	ttc Phe	gcc Ala	gct Ala	ctt Leu	caa Gln 360	att Ile	ttg Leu	acc Thr	aca Thr	cgc Arg 365	aac Asn	atg Met	act Thr	1:	104
	cca Pro	tct Ser 370	Pro	ttc Phe	att Ile	gat Asp	tgg Trp 375	Leu	tgg Trp	ggt Gly	gga Gly	ctc Leu 380	aat Asn	tat Tyr	cag Gln	atc Ile	1	152
	gag Glu 385	His	cac His	ttg Leu	ttc Phe	cca Pro 390	aca Thr	atg Met	cca Pro	cgt <u>A</u> rg	tgc Cys 395	aat Asn	ctg Leu	aat Asn	gct Ala	tgc Cys 400	1	200
	gtg Val	aaa Lys	tat Tyr	gtg Val	aaa Lys 405	gaa Glu	tgg Trp	tgc Cys	aaa Lys	gag Glu 410	aat Asn	aat Asn	ctt Leu	cct Pro	tac Tyr 415	Leu	1	248
	gtc Val	gat Asp	gac Asp	tac Tyr 420	Phe	gac Asp	gga Gly	tat Tyr	gca Ala 425	Met	aat Asn	ttg Leu	caa Gln	caa Gln 430	ttg Leu	aaa Lys	1	296
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		.2> .3>		orha	bdit	is e	lega	ns									•	
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Lys Trp Leu Tyr Leu Ser Glu Glu Leu Val Lys Lys His Pro Gly Gly 20 25 30

Ala Val Ile Glu Gln Tyr Arg Asn Ser Asp Ala Thr His Ile Phe His $35 \hspace{1cm} 40 \hspace{1cm} 45$

Ala Phe His Glu Gly Ser Ser Gln Ala Tyr Lys Gln Leu Asp Leu Leu 50 55 60

Lys Lys His Gly Glu His Asp Glu Phe Leu Glu Lys Gln Leu Glu Lys 65 70 75 80

Arg Leu Asp Lys Val Asp Ile Asn Val Ser Ala Tyr Asp Val Ser Val
85 90 95

Ala Gln Glu Lys Lys Met Val Glu Ser Phe Glu Lys Leu Arg Gln Lys
100 105 110

Leu His Asp Asp Gly Leu Met Lys Ala Asn Glu Thr Tyr Phe Leu Phe 115 120 125

Lys Ala Ile Ser Thr Leu Ser Ile Met Ala Phe Ala Phe Tyr Leu Gln 130 · 135 140

Tyr Leu Gly Trp Tyr Ile Thr Ser Ala Cys Leu Leu Ala Leu Ala Trp 145 150 155 160

Gln Gln Phe Gly Trp Leu Thr His Glu Phe Cys His Gln Gln Pro Thr 165 170 175

Lys Asn Arg Pro Leu Asn Asp Thr Ile Ser Leu Phe Phe Gly Asn Phe 180 180 190

Leu Gln Gly Phe Ser:Arg Asp Trp Trp Lys Asp Lys His Asn Thr His 195 200 205

His Ala Ala Thr Asn Val Ile Asp His Asp Gly Asp Ile Asp Leu Ala 210 215 220

Pro Leu Phe Ala Phe Ile Pro Gly Asp Leu Cys Lys Tyr Lys Ala Ser 225 230 235 240

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Gln Trp Val Phe Lys Glu Asn Gln Met Glu Tyr Lys Val Tyr Gln Arg 275 280 285

Phe Tyr Gln Leu Phe Leu Leu Pro Thr Trp Pro Leu Arg Val Ala Tyr 310 315 310 320 Phe Ile Ile Ser Gln Met Gly Gly Gly Leu Leu Ile Ala His Val Val 325 335 Thr Phe Asn His Asn Ser Val Asp Lys Tyr Pro Ala Asn Ser Arg Ile 340 345 Leu Asn Asn Phe Ala Ala Leu Gln Ile Leu Thr Thr Arg Asn Met Thr 355 360 Pro Ser Pro Phe Ile Asp Trp Leu Trp Gly Gly Leu Asn Tyr Gln Ile 370 375 Glu His His Leu Phe Pro Thr Met Pro Arg Cys Asn Leu Asn Ala Cys 385 390 400 Val Lys Tyr Val Lys Glu Trp Cys Lys Glu Asn Asn Leu Pro Tyr Leu 405 410 Val Asp Asp Tyr Phe Asp Gly Tyr Ala Met Asn Leu Gln Gln Leu Lys 420 Asn Met Ala Glu His Ile Gln Ala Lys Ala Ala 435 Asn Met Ala Glu His Ile Gln Ala Lys Ala Ala 435 <a< th=""><th></th><th>Asn</th><th>Ala 290</th><th></th><th>Trp</th><th>Glu</th><th>Gln</th><th>Ala 295</th><th></th><th>Ile</th><th>Val</th><th>Gly</th><th>His 300</th><th></th><th>Ala</th><th>Trp</th><th>Val</th><th>•</th><th></th></a<>		Asn	Ala 290		Trp	Glu	Gln	Ala 295		Ile	Val	Gly	His 300		Ala	Trp	Val	•	
Thr Phe Asn His Asn Ser Val Asp Lys Tyr Pro Ala Asn Ser Arg Ile 340 Leu Asn Asn Phe Ala Ala Leu Gln Ile Leu Thr Thr Arg Asn Met Thr 355 Pro Ser Pro Phe Ile Asp Trp Leu Trp Gly Gly Leu Asn Tyr Gln Ile 370 Glu His His Leu Phe Pro Thr Met Pro Arg Cys Asn Leu Asn Ala Cys 385 Glu His His Leu Phe Pro Thr Met Pro Arg Cys Asn Leu Asn Ala Cys 385 Val Lys Tyr Val Lys Glu Trp Cys Lys Glu Asn Asn Leu Pro Tyr Leu 405 Val Asp Asp Tyr Phe Asp Gly Tyr Ala Met Asn Leu Gln Gln Leu Lys 420 Asn Met Ala Glu His Ile Gln Ala Lys Ala Ala 435 Val Asp Asp Tyr Phe Asp Gly Tyr Ala Met Asn Leu Gln Gln Leu Lys 4210 Physomitrella patens (220) 221 DNA 2212 DNA 2213 Physomitrella patens (220) 2214 Gln Glu Val Val Glu Arg Phe Tyr Gly Glu Leu Asp Gly Lys Val Ser 1 15 Cag ggc gtg aat gca ttg ctg ggt agt ttt ggg gtg gag ttg acg gat Gln Gly Val Asn Ala Leu Leu Gly Ser Phe Gly Val Glu Leu Thr Asp 20 acg ccc act acc asa ggc ttg ccc ctc gtt gac agt ccc aca ccc atc Thr Pro Thr Thr Lys Gly Leu Pro Leu Val Asp Ser Pro Thr Pro Ile 35 gtc ctc ggt gtt tct gta tac ttg act att gtc att ggag gg gg gtt ttg Val Leu Gly Val Ser Val Tyr Leu Thr Ile Val Ile Gly Gly Leu Leu Val Leu Gly Val Ser Val Tyr Leu Thr Ile Val Ile Gly Gly Leu Leu				Gln	Leu	Phe			Pro	Thr	Trp			Arg	Val	. Ala			
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Val Lys Tyr Val Lys Glu Trp Cys Lys Glu Asn Asn Leu Pro Tyr Leu 405 Val Asp Asp Tyr Phe Asp Gly Tyr Ala Met Asn Leu Gln Gln Leu Lys 420 Asn Met Ala Glu His Ile Gln Ala Lys Ala Ala 435 Asn Met Ala Glu His Ile Gln Ala Lys Ala Ala 435 <pre> </pre> <pre> <pre> </pre> <pre> </pre> 210> 27 </pre> <pre> <211> 873 </pre> <pre> <212> DNA </pre> <pre> <213> Physcomitrella patens </pre> <pre> <220> </pre> <pre> <221> CDS </pre> <pre> <222> (1)(873) </pre> <pre> <223> Delta-6-Elongase </pre> <pre> </pre> <pre> <p< td=""><td></td><td>Pro</td><td></td><td></td><td>Phe</td><td>Ile</td><td>Asp</td><td></td><td>Ļeu</td><td>Trp</td><td>Gly</td><td>Gly</td><td></td><td>Asn</td><td>Tyr</td><td>Gln</td><td>Ile</td><td></td><td></td></p<></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre>		Pro			Phe	Ile	Asp		Ļeu	Trp	Gly	Gly		Asn	Tyr	Gln	Ile		
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Thr Pro Thr Thr Lys Gly Leu Pro Leu Val Asp Ser Pro Thr Pro Ile 35 40 45 gtc ctc ggt gtt tct gta tac ttg act att gtc att gga ggg ctt ttg Val Leu Gly Val Ser Val Tyr Leu Thr Ile Val Ile Gly Gly Leu Leu		cag Gln	ggc Gly	gtg Val	Asn	gca Ala	ttg Leu	ctg Leu	ggt Gly	Ser	ttt Phe	Gly ggg	gtg Val	gag Glu	Leu	acg Thr	gat Asp		96
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165

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175

aat Asi	act															
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Phe	Trp	Leu	Tyr	Ala 165	Ile	Asp	His	Ile	Phe 170	Leu	Ser	Ser	Ile	Lys 175	Ту	r	
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His 225		c Ası	p Cys	s Glı	230	Lev	ı Va	l His	s Thi	r Hi:	s Phe	e Trj	o Glu	1 Ту	r Va 24	al 10	
Thi	r Pr	о Ту:	r Le	u Ph 24	e Val	l Va	l Pr	o Ph	e Le [.] 25	u Il. 0	e Le	u Ph	e Ph	e As 25	n Pl 5	nė	
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Asn Pro Ile Gln Val Ile Ala Cys Ser Tyr Met Cys Val Glu Ala Ala 85 90 95

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Tyr Leu Thr Tyr Ser Arg Gln Cys Pro Gly Met Pro Pro Lys Val Pro 225 230 235 240

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Thr Ile Val His His Thr Arg Gly Phe Leu Val Ala Val Glu Ser Pro 50 60

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Cys Leu Val Ser Ile Ser Ala Tyr Met Cys Gly Gly Ile Leu Tyr Glu 115 120 125

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Phe	atc Ile	Ile	Asn	His 405	Ile	Ser	Glu	Ser	Cys 410	Glu	Phe	Met	Asn	Thr 415	Ser	1248
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Asp Glu Val Arg Arg His Ile Leu Pro Thr Asp Gly Trp Leu Thr Cys
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His Glu Gly Val Tyr Asp Val Thr Asp Phe Leu Ala Lys His Pro Gly
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Gly Gly Val Ile Thr Leu Gly Leu Gly Arg Asp Cys Thr Ile Leu Ile 115 120 125

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Arg Ile Gly Thr Leu Gln Asp Pro Lys Thr Phe Tyr Ala Trp Gly Glu 145 150 155

Ser Asp Phe Tyr Pro Glu Leu Lys Arg Ala Leu Ala Arg Leu Lys 165 170 175

Glu Ala Gly Gln Ala Arg Arg Gly Gly Leu Gly Val Lys Ala Leu Leu 180 185 190

Val Leu Thr Leu Phe Phe Val Ser Trp Tyr Met Trp Val Ala His Lys 195 200 205

Ser Phe Leu Trp Ala Ala Val Trp Gly Phe Ala Gly Ser His Val Gly 210 215 220

Leu Ser Ile Gln His Asp Gly Asn His Gly Ala Phe Ser Arg Asn Thr 225 230 235 240

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Ser Thr Val Trp Glu Tyr Gln His Val Ile Gly His His Gln Tyr Thr 260 265 270

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Val Phe Ser Ser Tyr Pro Leu Met Arg Met His Pro Asp Thr Ala Trp 290 295 300

Gln Pro His His Arg Phe Gln His Leu Phe Ala Phe Pro Leu Phe Ala 305 310 315 320

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Gln Ile Val Leu Pro Cys Tyr Leu His Gly Thr Ala Met Gly Leu Ala 370 380 380

Leu Phe Ser Val Ala His Leu Val Ser Gly Glu Tyr Leu Ala Ile Cys 385 390 395 400

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Lys Gly Val Pro Asp Ala Val Leu Arg Lys Tyr Lys Val Gly Lys Leu 65 70 75 80

Pro Gln Gly Lys Lys Gly Glu Thr Ser His Met Pro Thr Gly Leu Asp 85 90 95

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Glu Arg Val Ala Lys Lys Leu Ala Glu Pro Gly Leu Met Gln Arg Ala 115 120 125

Arg Met Glu Leu Trp Ala Lys Ala Ile Phe Leu Leu Ala Gly Phe Trp 130 135 140

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Thr Val Asn Val Tyr Ile Ser Gly Ile Val Lys Glu Thr Cys Glu Glu 465 470 475 480

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gtt tat acg ggg Val Tyr Thr Gly 210	tgt acg ggt Cys Thr Gly 215	Tyr Thr His	tac tat cat ac Tyr Tyr His Th 220	g aag cat 672 r Lys His
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agc aag aag aa Ser Lys Lys As: 275	t gat gat ggg n Asp Asp Gly	g aat aat ga g Asn Asn Gl 280	g gat caa tgt ca u Asp Gln Cys H: 285	ac aag gct 864 is Lys Ala
atg aag gat at Met Lys Asp Il 290	a tog gag gg e Ser Glu Gly 29	y Ala Lys Gi	g gtt gtg ggg c u Val Val Gly H 300	at gca gcg 912 is Ala Ala
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Ser Arg Ser Le 35	eu Val Gly Al	a Ala Leu H. 40	is Ser Gly Ser S 45	Ger Tyr Ala
Val Trp Val H 50	is Tyr Cys·As 5!		eu Glu Phe Phe i 60	Asp Thr Tyr
Phe Met Val L 65	eu Arg.Gly L 70	ys Met Asp G	ln Met Val Leu (75	Gly Glu Val 80
Gly Gly Ser V	al Trp Cys G 85	ly Val Gly T 9	yr Met Asp Met 0	Glu Lys Met 95

Ile Leu Leu Ser Phe Gly Val His Arg Ser Ala Gln Gly Thr Gly Lys
100 105 110

Ala Phe Thr Asn Asn Val Thr Asn Pro His Leu Thr Leu Pro Pro His 115 120 125

Ser Thr Lys Thr Lys Lys Gln Val Ser Phe Leu His Ile Tyr His His 130 135 140

Thr Thr Ile Ala Trp Ala Trp Trp Ile Ala Leu Arg Phe Ser Pro Gly 145 150 155 160

Gly Asp Ile Tyr Phe Gly Ala Leu Leu Asn Ser Ile Ile His Val Leu 165 170 175

Met Tyr Ser Tyr Tyr Ala Leu Ala Leu Leu Lys Val Ser Cys Pro Trp 180 185 190

Lys Arg Tyr Leu Thr Gln Ala Gln Leu Leu Gln Phe Thr Ser Val Val 195 200 205

Val Tyr Thr Gly Cys Thr Gly Tyr Thr His Tyr Tyr His Thr Lys His 210 215 220

Gly Ala Asp Glu Thr Gln Pro Ser Leu Gly Thr Tyr Tyr Phe Cys Cys 225 230 235 240

Gly Val Gln Val Phe Glu Met Val Ser Leu Phe Val Leu Phe Ser Ile 245 250 255

Phe Tyr Lys Arg Ser Tyr Ser Lys Lys Asn Lys Ser Gly Gly Lys Asp 260 265 270

Ser Lys Lys Asn Asp Asp Gly Asn Asn Glu Asp Gln Cys His Lys Ala 275 280 285

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		-		-	_		-	_			ata Ile		Trp	_		624
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Trp Leu Cys Asp Phe Arg Ser Ala Ile Thr Ile Ala Leu Ile Tyr Ile 35 40 45

Ala Phe Val Ile Leu Gly Ser Ala Val Met Gln Ser Leu Pro Ala Met 50 55 60

Asp Pro Tyr Pro Ile Lys Phe Leu Tyr Asn Val Ser Gln Ile Phe Leu 65 70 7.5 80

Cys Ala Tyr Met Thr Val Glu Ala Gly Phe Leu Ala Tyr Arg Asn Gly 85 90 95

Tyr Thr Val Met Pro Cys Asn His Phe Asn Val Asn Asp Pro Pro Val 100 105 110

Ala Asn Leu Leu Trp Leu Phe Tyr Ile Ser Lys Val Trp Asp Phe Trp 115 120 125

Asp Thr Ile Phe Ile Val Leu Gly Lys Lys Trp Arg Gln Leu Ser Phe 130 135 140

Leu His Val Tyr His His Thr Thr Ile Phe Leu Phe Tyr Trp Leu Asn 145 150 155 160

Ala Asn Val Leu Tyr Asp Gly Asp Ile Phe Leu Thr Ile Leu Leu Asn 165 170 175

Gly Phe Ile His Thr Val Met Tyr Thr Tyr Tyr Phe Ile Cys Met His 180 185 190

Thr Lys Asp Ser Lys Thr Gly Lys Ser Leu Pro Ile Trp Trp Lys Ser 195 200 205

Ser Leu Thr Ala Phe Gln Leu Leu Gln Phe Thr Ile Met Met Ser Gln 210 215 220

.77

Ala 1 225	Chr	Tyr	Leu	Va1	Phe 230	His	Gly (Cys 1	Asp I	Lys V 235	/al s	Ser I	Leu A	lrg :	Ile 240	
Thr I	Ile	Val	Tyr	Phe 245	Val	Ser	Leu	Leu :	Ser 1 250	Leu 1	Phe 1	Phe 1	Leu I	Phe 2 255	Ala	
Gln 1	Phe	Phe	Val 260	Gln	Ser	Tyr	Met	Ala 265	Pro 1	Lys :	Lys :	Lys :	Lys : 270	Ser .	Ala	
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gct Ala	gto Val	c act	t ggd r Gl	tto Phe	tgc Cys	agg Arg	gag Glu 40	cag Gln	tgg Trp	GJĀ āāā	att Ile	ccg Pro 45	aca Thr	gta Val	ttc Phe	144
tgc Cys	cts Les	g gg	c tac y Ty:	tto Lei	g gcc ı Ala	atg Met	gtc Val	tac Tyr	gcg Ala	gcc Ala	aga Arg 60	aga Arg	ccc Pro	ctc Leu	ccg Pro	192
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ggt Gly	to Se	g ac er Th	ır Gl	g ga y Gl	g ct u Le	c gt u Va	g caq l Gli 12	n Ası	ctt Lev	cag Glr	g act n Thi	ggc Gly 125	FIC	aco Thi	gct Ala	384
ct <u>c</u> Lev	g gc 1 Al 13	a Le	cc to	rc ct	c tt u Ph	c tg e Cy 13	s Ph	c ago e Se:	c aaq r Ly:	g ato	e Pro	o GT	g ttg 1 Lev	g ato 1 Mei	g gac L Asp	432
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gag Glu	gcc Ala	cat His 275	ggt Gly	gcc Ala	gct Ala	ggc Gly	aag Lys 280	aac Asn	aag Lys	aag Lys	aag Lys	ttg Leu 285	acc Thr	cgc Arg	gag Glu		864
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Gly Ser Thr Gly Glu Leu Val Gln Asn Leu Gln Thr Gly Pro Thr Ala 120

Leu Ala Leu Cys Leu Phe Cys Phe Ser Lys Ile Pro Glu Leu Met Asp

Thr Val Phe Leu Ile Leu Lys Ala Lys Lys Val Arg Phe Leu Gln Trp 150

Tyr His His Ala Thr Val Met Leu Phe Cys Trp Leu Ala Leu Ala Thr 170

Glu Tyr Thr Pro Gly Leu Trp Phe Ala Ala Thr Asn Tyr Phe Val His 185

Ser Ile Met Tyr Met Tyr Phe Phe Leu Met Thr Phe Lys Ser Ala Ala 205 200 195

Lys Val Val Lys Pro Ile Ala Pro Leu Ile Thr Val Ile Gln Ile Ala . 215 210

Gln Met Val Trp Gly Leu Ile Val Asn Gly Ile Ala Ile Thr Thr Phe 230

Phe Thr Thr Gly Ala Cys Gln Ile Gln Ser Val Thr Val Tyr Ser Ala 250

Ile Ile Met Tyr Ala Ser Tyr Phe Tyr Leu Phe Ser Gln Leu Phe Phe 260 265

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cac His	acc	act Thr	tgg Trp 100	aat Asn	ttc Phe	G1Y ggg	ctc Leu	cag Gln 105	ttc Phe	acc Thr	atc Ile	tgc Cys	ggc Gly 110	agc Ser	acc Thr	•	336
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tac Tyr	gcc	tcc Ser	tac Tyr 260	Phe	tac Tyr	ctc Leu	ttc Phe	ggc Gly 265	Gln	Leu	ttc Phe	ttc Phe	gag Glu 270	Ala	cag Gln		816

ggt Gly	to Se	r	gct Ala 275	gga Gly	a L	ag 9 ys 1	gac Asp	aag Lys	aa Ly 28	s L	ag t ys I	tg Seu	gcc Ala	cga Arg	ga Gl 28	<u>u</u> 1	tg a eu s	agc Ser	C9	ra :g	8	64
aag Lys	gt Va 29	al S	Ser	cgg	g J A	ct (ctc Leu	aca Thr 295	AT.	a a a T	.cg (ggc Gly	gaa Glu	gag Glu 300	va	g t 1 S	cg a	aag Lys	Ca Hi	ic is	9	12
	L		gtg Val			ga:													,			927
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Th:	r L	eu	Asn	ні 20		Asp	Phe	Se	r S	er '	Val 25	Glu	Pro	Pho	e L	ys '	Val 30	Val	T	hr		ż
G1	n F	he	Cys 35	Ax	g	Asp	Gln	Tr	р А 4	la 0	Ile	Pro	Thr	· Va	1 P 4	he 5	Cys	Ile	e G	ly		
ту		ieu 50	Ala	ı Me	et	Val	Туг	- Al 55	a T	hr	Arg	Arg	Pro	60	e A	la.	Lys	His	s I	Pro	٠	
Ту 65		Met	Sei	c Le	eu	Val	Ası 70) Ar	g C	:ys	Phe	Ala	Ala 75	a Tr	np A	sn	Leu	G13	y I	Leu 30		
Se	er 1	Leu	Phe	e S	er	Cys 85	Ťr	p G]	Ly I	he	Tyr	His 90	Me'	t Al	a ī	7al	Gly	ъе: 95	u i	Ser		
H	is '	Thr	Th		00 Tp	Asn	ı Ph	e G	ly I	Leu	Gln 105	Phe	∋ Th	r II	Le (Cys	Gly 110	se:	r '	Thr		
TÌ	hr	Glu	1 Le		al	Asr	ı Gl	y Pi	he (31n 120	Lys	Gl:	y Pr	o A.	la i	Ala 125	Leu	ı Al	a	Leu		
I	le	Le: 13(.e C	ys	Phe	e Se	r L	ys 35	Ile	Pro	Gl	u Le	u G 1	ly . 40	Asp	Tha	c Va	1	Phe		
	eu 45	Ile	e Le	eu I	'ns	Gl	y Ly 15	rs L	ys	Val	Arg	g Ph	е Le 15	eu G 5	ln	Trp	ту	r Hi	. s	His 160		
	hr	Th	r Va	al N	ſet	Le 16		ne C	ys:	Trp	Me	t Al 17	a Le 0	eu A	.la	Thr	Gl.	u T <u>y</u> 17	/r 75	Thr		
F	ro	Gl	y Le		rr 180		e A	la A	la	Thr	18	n Ty 5	r Pl	ne V	al	His	: Se 19	r II	le	Met		

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	rp 225	Gly	Leu	Val	Val	Asn 230	Ala	Ile	Ala	Val	Gly 235	Thr	Phe	Phe	Thr	Thr 240	, ,		
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•	Гуr	Ala	Ser	Туг 260	Phe	Tyr	Leu	Phe	Gly 265	Gln	Leu	Phe	Phe	Glu 270	Ala	Gln			
(31y	Ser	Ala 275	Gly	Lys	Asp	Lys	Lys 280	Lys	Leu	Ala	Arg	Glu 285	Leu	Ser	Arg	٠.	•	
. 1	ŗĀs	Val 290		Arg	Ala	Leu	Thr 295	Ala	Thr	Gly	Gļu	Glu 300	Val	Ser	Lys	His			
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Met Pro Val Ala Ile Ile Phe Leu Leu Tyr Leu Gly Val Val Trp Ala 40

Gly Pro Lys Leu Met Lys Arg Arg Glu Pro Val Asp Leu Lys Ala Val 55 60 50

Leu Ile Val Tyr Asn Phe Ala Met Val Cys Leu Ser Val Tyr Met Phe

His Glu Phe Leu Val Thr Ser Leu Leu Ser Asn Tyr Ser Tyr Leu Cys 90

Gln Pro Val Asp Tyr Ser Thr Ser Pro Leu Ala Met Arg Met Ala Lys 105 100

Val Cys Trp Trp Phe Phe Phe Ser Lys Val Ile Glu Leu Ala Asp Thr 120

Val Phe Phe Ile Leu Arg Lys Lys Asn Ser Gln Leu Thr Phe Leu His

Val Tyr His His Gly Thr Met Ile Phe Asn Trp Trp Ala Gly Val Lys 150 155

Tyr Leu Ala Gly Gly Gln Ser Phe Phe Ile Gly Leu Leu Asn Thr Phe

Val His Ile Val Met Tyr Ser Tyr Tyr Gly Leu Ala Ala Leu Gly Pro 185

His Thr Gln Lys Tyr Leu Trp Trp Lys Arg Tyr Leu Thr Ser Leu Gln 200 195

Leu Leu Gln Phe Val Leu Leu Thr Thr His Thr Gly Tyr Asn Leu Phe 220

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tto	tto Phe	: Ile	cto Lev	g cgg 1 Arg	aag Lys	aac Asn 135	Asn	cat His	caa Gln	ato Ile	acg Thr	Pile	ctg Leu	cac His	atc Ile	432
tad Tyr 145	: His	cat	get Ala	ago a Ser	atg Met 150	Leu	aac Asn	atc Ile	tgg Trp	tgg Trg 159	Pne	gto Val	atg L Met	aac Asr	tgg Trp 160	480
gto Va	g cco	tg Cy	t gg s Gl	t cac y His 165	Ser	tac Tyr	ttt Phe	ggt Gly	gcc Ala 170	i sei	c te	g aad 1 Asi	ago n Ser	Phe 175	atc Ile	528
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ca Hi	c ct s Le	t gt u Va	al Se	ca ca er Gl	a aa n Ly	g aa s Ly	g ga s Gl	g ta u Ty 26	T HI	t ca .s Gl	ng aa .n As	at gg sn Gl	gc to Ly Se 27	T AG	t gct l Ala	816
to Se	ea tt	eu A	at gg sn G: 75	gc ca ly Hi	ıt gt .s Va	g aa 1 As	it gg in Gl 28	y Va	g ac	a co nr Pi	ec ac	nr G.	aa ac lu Th 35	c at ir II	t aca e Thr	864

210

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Cys Asp Phe Pro Arg Gly Trp Leu Tyr Phe Gln Ile Phe Tyr Val Ile 235 230

Thr Leu Ile Ala Leu Phe Ser Asn Phe Tyr Ile Gln Thr Tyr Lys Lys 250 245

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Ser Leu Asn Gly His Val Asn Gly Val Thr Pro Thr Glu Thr Ile Thr

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Arg Gln Pro Val Ser Cys Arg Gly Leu Leu Val Tyr Asn Leu Gly

60

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Val His Ile Val Met Tyr Ser Tyr Tyr Gly Leu Ala Ala Leu Gly Pro 185

His Thr Gln Lys Tyr Leu Trp Trp Lys Arg Tyr Leu Thr Ser Leu Gln 205 200 195

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Lys Met Asp Gln Val Ser Phe Leu His Ile Tyr His His Thr Thr Ile 165 170 175

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Tyr Tyr Ala Leu Ala Leu Leu Lys Val Ser Cys Pro Trp Lys Arg Tyr 210 215 220

Leu Thr Gln Ala Gln Leu Leu Gln Phe Thr Ser Val Val Val Tyr Thr 225 230 235 240

Gly Cys Thr Gly Tyr Thr His Tyr Tyr His Thr Lys His Gly Ala Asp 245 250 255

Glu Thr Gln Pro Ser Leu Gly Thr Tyr Tyr Phe Cys Cys Gly Val Gln 260 265 270

Val Phe Glu Met Val Ser Leu Phe Val Leu Phe Ser Ile Phe Tyr Lys 275 280 285

Arg Ser Tyr Ser Lys Lys Asn Lys Ser Gly Gly Lys Asp Ser Lys Lys 290 295 300

Asn Asp Asp Gly Asn Asn Glu Asp Gln Cys His Lys Ala Met Lys Asp 305 310 315 320

Ile Ser Glu Gly Ala Lys Glu Val Val Gly His Ala Ala Lys Asp Ala 325 330 335

Gly Lys Leu Val Ala Thr Ala Ser Lys Ala Val Lys Arg Lys Gly Thr 340 345 350

Arg Val Thr Gly Ala Met 355

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agt cta ccg Ser Leu Pro	tca cta aag tad Ser Leu Lys Ty 20	gtt acg gac Val Thr Asp 25	aac tac ctt gcc aaa aag Asn Tyr Leu Ala Lys Lys 30	96
tat gat atg Tyr Asp Met 35	aag tca ctc cta Lys Ser Leu Le	a acg gaa tca 1 Thr Glu Ser 40	atg gtg ttg tac aat gtg Met Val Leu Tyr Asn Val 45	144
gcg caa gtg Ala Gln Val 50	ctg ctc aat ggg Leu Leu Asn Glg 55	g tgg acg gtg / Trp Thr Val	tat gcg att gtg gat gcg Tyr Ala Ile Val Asp Ala 60	192
gtg atg aat Val Met Asn 65	aga gac cat cc Arg Asp His Pro	g ttt att gga o Phe Ile Gly	agt aga agt ttg gtt ggg Ser Arg Ser Leu Val Gly 75 80	240
gcg gcg ttg Ala Ala Leu	cat agt ggg ag His Ser Gly Se 85	tcg tat gcg r Ser Tyr Ala 90	gtg tgg gtt cat tat tgt Val Trp Val His Tyr Cys 95	288
gat aag tat Asp Lys Tyr	ttg gag ttc tt Leu Glu Phe Ph 100	t gat acg tat e Asp Thr Tyr 105	ttt atg gtg ttg agg ggg Phe Met Val Leu Arg Gly 110	g 336 /
aaa atg gac Lys Met Asp 115	cag gtc tcc tt Gln Val Ser Ph	c ctc cac atc e Leu His Ile 120	tac cac cac acg acc ata Tyr His His Thr Thr Ile 125	a 384 e
gcg tgg gca Ala Trp Ala 130	tgg tgg atc gc Trp Trp Ile Al 13	a Leu Arg Phe	tcc ccc ggt gga gac att Ser Pro Gly Gly Asp Ile 140	± 432
tac ttc ggg Tyr Phe Gly 145	gca ctc ctc aa Ala Leu Leu As 150	c tcc atc atc n Ser Ile Ile	cac gtc ctc atg tat tcc His Val Leu Met Tyr Set 155	<u>ר</u>
tac tac gcc Tyr Tyr Ala	ctt gcc cta ct Leu Ala Leu Le 165	c aag gtc agt u Lys Val Ser 170	tgt cca tgg aaa cga tac Cys Pro Trp Lys Arg Ty: 175	c. 528 r
ctg act caa Leu Thr Gln	gct caa tta tt Ala Gln Leu Le 180	g caa ttc aca u Gln Phe Thr 185	agt gtg gtg gtt tat ac Ser Val Val Val Tyr Th 190	g 576 r
ggg tgt acg Gly Cys Thr 195	Gly Tyr Thr Hi	t tac tat cat s Tyr Tyr His 200	acg aag cat gga gcg ga Thr Lys His Gly Ala As 205	t 624 p
gag aca cag Glu Thr Gln 210	cct agt tta gg Pro Ser Leu Gl 21	y Thr Tyr Tyr	ttc tgt tgt gga gtg ca Phe Cys Cys Gly Val Gl 220	g 672 n
gtg.ttt gag Val Phe Glu 225	atg gtt agt tt Met Val Ser Le 230	g ttt gta ctc u Phe Val Leu	ttt tcc atc ttt tat aa Phe Ser Ile Phe Tyr Ly 235 24	S
cga tcc tat Arg Ser Tyr	tcg aag aag a Ser Lys Lys A	ic aag tca gga sn Lys Ser Gly	, gga aag gat agc aag aa Gly Lys Asp Ser Lys Ly	g 768 s

				* *	
	245	•	250		255
aat gat gat ggg Asn Asp Asp Gly 260	Asn Asn Glu	gat caa Asp Gln 265	tgt cac aa Cys His Ly	g gct atg ys Ala Met 270	aag gat 816 Lys Asp
ata tcg gag ggt Ile Ser Glu Gly 275	gcg aag gag Ala Lys Glu	gtt gtg Val Val 280	ggg cat go Gly His Al	ca gcg aag la Ala Lys 285	gat gct 864 Asp Ala
gga aag ttg gtg Gly Lys Leu Val 290	g gct acg gcg . Ala Thr Ala 295	agt aag Ser Lys	gct gta aa Ala Val Ly 30	ys Arg Lys	gga act 912 Gly Thr
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Tyr Asp Met Lys	s Ser Leu Leu	Thr Glu 40	Ser Met Va	al Leu Tyr 45	Asn Val
Ala Gln Val Lev 50	ı Leu Asn Gly 55	Trp Thr	Val Tyr A	la Ile Val O	Asp Ala
Val Met Asn Arg	g Asp His Pro 70	Phe Ile	Gly Ser A	rg Ser Leu	Val Gly 80
Ala Ala Leu His	s Ser Gly Ser 85	Ser Tyr	Ala Val T	rp Val His	Tyr Cys 95
Asp Lys Tyr Let		Asp Thr	Tyr Phe Mo	et Val Leu 110	Arg Gly
Lys Met Asp Gli 115	n Val Ser Phe	Leu His 120	Ile Tyr H	is His Thr 125	Thr Ile
Ala Trp Ala Trp	p Trp Ile Ala 135			ro Gly Gly 40	Asp Ile
Tyr Phe Gly Ala	a Leu Leu Asn 150	Ser Ile	Ile His V	al Leu Met	Tyr Ser 160
Tyr Tyr Ala Le	u Ala Leu Leu 165	Lys Val	Ser Cys P	ro Trp Lys	Arg Tyr 175

Leu Thr Gln Ala Gln Leu Leu Gln Phe Thr Ser Val Val Val Tyr Thr 180 185 190	
Gly Cys Thr Gly Tyr Thr His Tyr Tyr His Thr Lys His Gly Ala Asp 195 200 205	
Glu Thr Gln Pro Ser Leu Gly Thr Tyr Tyr Phe Cys Cys Gly Val Gln 210 215 220	
Val Phe Glu Met Val Ser Leu Phe Val Leu Phe Ser Ile Phe Tyr Lys 225 230 235 240	·
Arg Ser Tyr Ser Lys Lys Asn Lys Ser Gly Gly Lys Asp Ser Lys Lys 245 250 255	
Asn Asp Asp Gly Asn Asn Glu Asp Gln Cys His Lys Ala Met Lys Asp 260 265 270	
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gcg caa gtg ctg ctc aat ggg tgg acg gtg tat gcg att gtg gat gcg Ala Gln Val Leu Leu Asn Gly Trp Thr Val Tyr Ala Ile Val Asp Ala 50 55 60	192
gtg atg aat aga gac cat ccg ttt att gga agt aga agt ttg gtt ggg Val Met Asn Arg Asp His Pro Phe Ile Gly Ser Arg Ser Leu Val Gly	240

	65					70					75	•				80		
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	aaa Lys	atg Met	gac Asp 115	Gln	gtc Val	tcc Ser	ttc Phe	ctc Leu 120	cac His	atc Ile	tac Tyr	cac	cac His 125	Thr	acc Thr	ata Ile		384
	gcg Ala	tgg Trp 130	gca Ala	tgg Trp	tgg Trp	atc Ile	gcc Ala 135	ctc Leu	egc Arg	ttc Phe	tcc Ser	ccc Pro 140	Gly	gga Gly	gac Asp	att		432
	tac Tyr 145	ttc Phe	GJÀ aaa	gca Ala	ctc Leu	ctc Leu 150	aac Asn	tcc Ser	atc Ile	atc Ile	cac His 155	gtc Val	ctc Leu	atg Met	tat Tyr	tcc Ser 160	٠.	480
	tac Tyr	tac Tyr	gcc Ala	ctt Leu	gcc Ala 165	Leu	ctc Leu	aag Lys	gtc Val	agt Ser 170	tgt Cys	cca Pro	tgg Trp	aaa Lys	cga Arg 175	tac Tyr		528
	ctg Leu	act Thr	caa Gln	gct Ala 180	caa Gln	tta Leu	ttg Leu	caa Gln	ttc Phe 185	aca Thr	agt Ser	gtg Val	gtg Val	gtt Val 190	tat Tyr	acg Thr		576
	Gly	Cys	Thr 195	Gly	Tyr	Thr	His	Tyr 200	tat Tyr	His	Thr	Lys	His 205	Gly	Ala	Asp		624
•	Glu	Thr 210	Gln	Pro	Ser	Leu	Gly 215	Thr	tat Tyr	Tyr	Phe	Cys 220	CYs	Gly	Val	Gln		672
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	Ile	Ser	Glu 275	Gly	Ala	Lys	Glu	Val 280	Val	Gly	His	Ala	Ala 285	Lys	Asp			864
•	Gly	Lys 290	Leu	Val	Ala	Thr	Ala 295	agt Ser	aag Lys	gct Ala	gta Val	aag Lys 300	agg Arg	aag Lys	gga Gly	act Thr		912
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Met His Ser Tyr Lys Val Pro Leu Gly Leu Thr Val Phe Tyr Leu Leu 1 5 10 15

Ser Leu Pro Ser Leu Lys Tyr Val Thr Asp Asn Tyr Leu Ala Lys Lys 20 25 30

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Ala Gln Val Leu Leu Asn Gly Trp Thr Val Tyr Ala Ile Val Asp Ala 50 55

Val Met Asn Arg Asp His Pro Phe Ile Gly Ser Arg Ser Leu Val Gly 65 70 75 80

Ala Ala Leu His Ser Gly Ser Ser Tyr Ala Val Trp Val His Tyr Cys 85 90 95

Asp Lys Tyr Leu Glu Phe Phe Asp Thr Tyr Phe Met Val Leu Arg Gly 100 105 110

Lys Met Asp Gln Val Ser Phe Leu His Ile Tyr His His Thr Thr Ile 115 120 125

Ala Trp Ala Trp Trp Ile Ala Leu Arg Phe Ser Pro Gly Gly Asp Ile 130 135 140

Tyr Phe Gly Ala Leu Leu Asn Ser Ile Ile His Val Leu Met Tyr Ser 145 150 155 160

Tyr Tyr Ala Leu Ala Leu Leu Lys Val Ser Cys Pro Trp Lys Arg Tyr 165 170 175

Leu Thr Gln Ala Gln Leu Leu Gln Phe Thr Ser Val Val Val Tyr Thr 180 185 190

Gly Cys Thr Gly Tyr Thr His Tyr Tyr His Thr Lys His Gly Ala Asp 195 200 205

Glu Thr Gln Pro Ser Leu Gly Thr Tyr Tyr Phe Cys Cys Gly Val Gln 210 215 220

Val Phe Glu Met Val Ser Leu Phe Val Leu Phe Ser Ile Phe Tyr Lys 225 230 235 240

Arg Ser Tyr Ser Lys Lys Asn Lys Ser Gly Gly Lys Asp Ser Lys Lys 245

Asn Asp Asp Gly Asn Asn Glu Asp Gln Cys His Lys Ala Met Lys Asp 260 265 270

	Ile	Ser	Glu 275	Gly	Ala	Lys	Glu	Val 280	Val	Gly	His	Ala	Ala 285	Lys	Asp	Ala		
	Gly	Lys 290	Leu	Val	Ala	Thr	Ala 295	Ser	Lys	Ala	Val	Lys 300	Arg	Lys	Gly	Thr		
	Arg 305	Val	Thr	Gly	Ala	Met 310			•								٠	
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	cag Gln	gtc Val	gtc Val	gac Asp 20	cag Gln	atc Ile	atg Met	ggc Gly	ggc Gly 25	gcc Ala	gag Glu	ccg Pro	tac Tyr	aag Lys 30	ctg Leu	aca Thr		96
	gaa Glu	Gly	cgc Arg 35	atg Met	acg Thr	aac Asn	gtc Val	gag Glu 40	acg Thr	atg Met	ctg Leu	gcg Ala	atc Ile 45	gag Glu	tgc Cys	ggc Gly		144
	tac Tyr	gcc Ala 50	gcc Ala	atg Met	ctg Leu	ctg Leu	ttc Phe 55	ctg Leu	acc Thr	ccg Pro	atc Ile	atg Met 60	aag Lys	cag Gln	gcc Ala	gag Glu		192
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	ccg Pro	cac	gcg Ala 115	cac His	ggc	atg Met	gcc Ala	caa Gln 120	atc Ile	gtg Val	tgg Trp	atc Ile	ttt Phe 125	tac Tyr	gtg Val	tcc Ser		384
	aag Lys	gcg Ala 130	tac Tyr	gag Glu	ttc Phe	gtg Val	gac Asp 135	acg Thr	ctg Leu	atc Ile	atg Met	atc Ile 140	ctg Leu	tgc Cys	aaa Lys	aag Lys	-	432
	ttc Phe 145	aac	cag Gln	gtc Val	tcc Ser	gtc Val 150	ctg `Leu	cac His	gtg Val	tac Tyr	cac His 155	cac His	gcc Ala	acc Thr	atc Ile	ttt Phe 160		480
,	gct Ala	atc Ile	tgg Trp	ttt Phe	atg Met	atc Ile	gcc Ala	aag Lys	tac Tyr	gcc Ala	ccg Pro	ggc	ggc	gac Asp	gca Ala	tac Tyr		528

11:5

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	Ser 225	Leu	Tyr	Asp.	туг	Leu 230	Tyr	Pro	Cys	Asp	Tyr 235	Pro	Gln	Gly	Leu	Val 240	
,	Lys	Leu	Leu	Gly	Val 245	Tyr	Met	Leu	Thr	Leu 250		Ala	Leu	Phe	Gly 255	Asn	•
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	ctc Leu	ccg Pro	gcg	atc Ile	gcg Ala	acg Thr	acg Thr	atg Met	tac Tyr	ctg Leu	ttg Leu	ttc Phe	tgc Cys	ctg Leu	gtc Val	gga Gly	192

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att Ile	cga Arg 210	Cy	c ccg	tgg Trp	aag Lys	cga Arg 215	ТУТ	ato Ile	acc Thr	cag Glr	g gct n Ala 220	i GTI	ato Met	g cto	caa Gln		672
Phe 225	e Val	ati	t gto	tto l Phe	gcg Ala 230	His	gcc Ala	gtg Val	r tto Phe	gtg Val 235	г пел	g cgt 1 Arg	caq g Gli	g aaq n Lys	g cac s His 240	•	720
tg: Cy:	c cci	g gt o Va	c acc	c ctt r Leu 249	ı Pro	tgg Tr	g gcg Ala	g caa a Glr	a ato Met 250	E Pho	c gto e Vai	c ato	g ac	g aad r Asi 25	atg n Met 5		768
ct: Le	c gt u Va	g ct l Le	c tt u Ph 26	e Gly	g aad y Asi	tto n Phe	tac Ty	c cto Let 26!	T LA	g gc	g ta a Ty:	c tc r Se	g aa r As: 27	ii ny	g tcg s Ser		816
cg Ar	g Gl	c ga y As 27	p Gl	c gc y Ala	g ag a Se:	t tc r Se	gto r Va. 28	T LA	a cc s Pr	a gc o Al	c ga a Gl	g ac u Th 28	T 111	g cg r Ar	c gcg g Ala		864
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Leu Pro Ala Ile Ala Thr Thr Met Tyr Leu Leu Phe Cys Leu Val Gly 50 60

Pro Arg Leu Met Ala Lys Arg Glu Ala Phe Asp Pro Lys Gly Phe Met 65 70 75 80

Leu Ala Tyr Asn Ala Tyr Gln Thr Ala Phe Asn Val Val Leu Gly
85 90 95

Met Phe Ala Arg Glu Ile Ser Gly Leu Gly Gln Pro Val Trp Gly Ser 100 105 110

Thr Met Pro Trp Ser Asp Arg Lys Ser Phe Lys Ile Leu Leu Gly Val 115 120 125

Trp Leu His Tyr Asn Asn Gln Tyr Leu Glu Leu Leu Asp Thr Val Phe 130 135 140

Met Val Ala Arg Lys Lys Thr Lys Gln Leu Ser Phe Leu His Val Tyr 145 150 155 160

His His Ala Leu Leu Ile Trp Ala Trp Trp Leu Val Cys His Leu Met 165 170 175

Ala Thr Asn Asp Cys Ile Asp Ala Tyr Phe Gly Ala Ala Cys Asn Ser 180 185 190

Phe Ile His Ile Val Met Tyr Ser Tyr Tyr Leu Met Ser Ala Leu Gly 195 200 205

Ile Arg Cys Pro Trp Lys Arg Tyr Ile Thr Gln Ala Gln Met Leu Gln 210 215 220

Phe Val Ile Val Phe Ala His Ala Val Phe Val Leu Arg Gln Lys His 225 230 235 240

Cys Pro Val Thr Leu Pro Trp Ala Gln Met Phe Val Met Thr Asn Met 245 250 255

Leu Val Leu Phe Gly Asn Phe Tyr Leu Lys Ala Tyr Ser Asn Lys Ser 260 265 270

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gcg Ala	tat Tyr	cag Gln 115	Asn	gga Gly	tat Tyr	act Thr	tta Leu 120	Trp	ggt	aat Asn	gaa Glu	ttc Phe 125	Бys	gcc Ala	acg Thr	384
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Caa Glr	gta Val	a agt L Sei	t tto r Phe	cta Lev 165	ı His	att i Ile	tat Tyi	cac His	cac His	s Sei	c acg	att : Ile	tco Ser	ttt Phe 175	att Ile	528
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tgg tgg ggt Trp Trp Gly 225	cgc cac ct Arg His Le 23	eu Thr Gln	atg cag Met Gln	atg ctt ca Met Leu G3 235	ag ttt tto In Phe Phe	ttc 720 Phe 240
aac gta ctt Asn Val Leu	caa gcg tt Gln Ala Le 245	g tac tgc eu Tyr Cys	gct tcg Ala Ser 250	ttc tct ac	eg tat ccc nr Tyr Pro 255	Lys
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ttt ggg cat Phe Gly His 275	Phe Tyr Ty	at tcc aag yr Ser Lys 280	cac ata His Ile	Ala Ala A	ct aag cto la Lys Leu 85	cag 864 Gln
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Gln '	Val	Ser	Phe	Leu 165	His	Ile	туг	His	His 170	Ser	Thr	Ile	Ser	Phe 175	Ile	
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Trp 225	Trp	Gly	Arg	, His	: Leu 230	Thr	Glr	n Met	: Gln	Met 235	: Lev	ı Gln	. Phe	Phe	Phe 240	
Asn	Val	. Lev	ı Glr	n Ala 245	a Leu S	туг	Cys	s Alá	250	Phe	e Sei	r Thr	туг	255	Lys ;	
Phe	Ļeu	. Sei	r Ly: 26	s Ile O	e Lev	ı Let	ı Va	1 Ty: 26!	r Met 5	. Met	t Se	r Lei	1 Leu 270	ı Gl <u>y</u>	y Leu	
Phe	Gly	/ Ні: 27		е Ту	т Туі	c Se:	28	s Hi: O	s Ile	e Ala	a Al	a Ala 28	a Lys	s Lei	ı Gln	
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ca Hi	.c gg .s G]	gc ca Ly G	aa g ln V	tc to	ac ga yr As	ac g	tg t al S	cc te er S	ct to	gg g rp A	cc g la A	cc ci la L	tt ca eu H:	at co is Po	co Gly	144

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gct cgg gac ctc tc Ala Arg Asp Leu Se: 435	t aat ccg ctc cc r Asn Pro Leu Pr 440	a aag aat atg gtg t o Lys Asn Met Val T 445	gg gaa gct 1344 rp Glu Ala
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His Gly Gln Val Ty 35	r Asp Val Ser S 40	er Trp Ala Ala Leu : 45	His Pro Gly
Gly Thr Ala Pro Le	eu Met Ala Leu A 55	la Gly His Asp Val 60	Thr Asp Ala
Phe Leu Ala Tyr H: 65	is Pro Pro Ser T 70	hr Ala Arg Leu Leu 75	Pro Pro Leu 80
Ser Thr Asn Leu L		is Ser Val Ser Pro 90	Thr Ser Ser 95

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His Leu Ala Ser Gly Gly Ala Met Gly Phe Ala Trp Ile Gln Cys Gly
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Trp Ile Gly His Asp Ser Gly His Tyr Arg Ile Met Ser Asp Arg Lys
165 170 175

Trp Asn Trp Phe Ala Gln Ile Leu Ser Thr Asn Cys Leu Gln Gly Ile 180 185 190

Ser Ile Gly Trp Trp Lys Trp Asn His Asn Ala His His Ile Ala Cys 195 200 205

Asn Ser Leu Asp Tyr Asp Pro Asp Leu Gln Tyr Ile Pro Leu Leu Val 210 215 220

Val Ser Pro Lys Phe Phe Asn Ser Leu Thr Ser Arg Phe Tyr Asp Lys 225 230 235 240

Lys Leu Asn Phe Asp Gly Val Ser Arg Phe Leu Val Cys Tyr Gln His 245 250 255

Trp Thr Phe Tyr Pro Val Met Cys Val Ala Arg Leu Asn Met Leu Ala 260 265 270

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Gln Glu Val Phe Gly Leu Ala Val Phe Trp Val Trp Phe Pro Leu Leu 290 295 300

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Phe Ser Ser Asp Val Tyr Val Gly Pro Pro Val Gly Asn Asp Trp Phe 340 345 350

Lys Lys Gln Thr Ala Gly Thr Leu Asn Ile Ser Cys Pro Ala Trp Met 355 360 365

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119

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165 170

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Ser Ile Gly Trp Trp Lys Trp Asn His Asn Ala His His Ile Ala Cys 195 200 205

Asn Ser Leu Asp Tyr Asp Pro Asp Leu Gln Tyr Ile Pro Leu Leu Val 210 215 220

Val Ser Pro Lys Phe Phe Asn Ser Leu Thr Ser Arg Phe Tyr Asp Lys 225 230 235

Lys Leu Asn Phe Asp Gly Val Ser Arg Phe Leu Val Cys Tyr Gln His 245 250 255

Trp Thr Phe Tyr Pro Val Met Cys Val Ala Arg Leu Asn Met Ile Ala 260 265 270

Gln Ser Phe Ile Thr Leu Phe Ser Ser Arg Glu Val Gly His Arg Ala 275 280 285

Gln Glu Ile Phe Gly Leu Ala Val Phe Trp Val Trp Phe Pro Leu Leu 290 295 300

Leu Ser Cys Leu Pro Asn Trp Ser Glu Arg Ile Met Phe Leu Leu Ala 305 310 315 320

Ser Tyr Ser Val Thr Gly Ile Gln His Val Gln Phe Ser Leu Asn His 325 330 335

Phe Ser Ser Asp Val Tyr Val Gly Pro Pro Val Ala Asn Asp Trp Phe 340 345

Lys Lys Gln Thr Ala Gly Thr Leu Asn Ile Ser Cys Pro Ala Trp Met 355 360 365

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Pro Arg Met Pro Arg Gly Gln Phe Arg Lys Ile Ser Pro Phe Val Arg 385 390 395 400

Asp Leu Cys Lys Lys His Asn Leu Pro Tyr Asn Ile Ala Ser Phe Thr 405 410 415

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Met Val Ala Arg Lys Lys Thr Lys Gln Leu Ser Phe Leu His Val Tyr 145 150 155 160

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Phe Ile His Ile Val Met Tyr Ser Tyr Tyr Leu Met Ser Ala Leu Gly
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Ile Arg Cys Pro Trp Lys Arg Tyr Ile Thr Gln Ala Gln Met Leu Gln 210 215 220

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127

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Phe Leu Ile Val Leu Ser Leu Tyr Met Cys Leu Gly Cys Val Ala Gln 100 105 110

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Asn Val Leu Gln Ala Leu Tyr Cys Ala Ser Phe Ser Thr Tyr Pro Lys 245 250 255

528 .

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aag aag tgg aa Lys Lys Trp Ly 145	ag cag ctc ago ys Gln Leu`Sei 150	ttt ctc cac Phe Leu His	gtc tac cac Val Tyr His 155	cac gcg agc 48 His Ala Ser 160	0

atc agc ttc atc tgg ggc atc atc gcc cgc ttc gcg ccc ggt ggc gac Ile Ser Phe Ile Trp Gly Ile Ile Ala Arg Phe Ala Pro Gly Gly Asp

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Phe Leu Thr Gly Leu Ser Met Tyr Met Ala Thr Glu Cys Ala Arg Gln

Ala Tyr Leu Gly Gly Tyr Lys Leu Phe Gly Asn Pro Met Glu Lys Gly

Thr Glu Ser His Ala Pro Gly Met Ala Asn Ile Ile Tyr Ile Phe Tyr 120

115

90

Val	Ser 130	Lys	Phe	Leu	Glu	Phe 135	Leu	Asp	Thr	Val	Phe 140	Met	Ile	Leu	Gly	
Lys 145	Гуs	Trp	Lys	Gln	Leu 150	Ser	Phe	Leu	His	Val 155	Tyr	His	His	Ala	Ser 160	
Ile	Ser	Phe	Ile	Trp 165	Gly	Ile	Ile	Ala	Arg 170	Phe	Ala	Pro	Gly	Gly 175	Asp	
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:	Tyr	195					200			•		205				
	Pro 210					215					220					
225					230	•				235					240	
	Val			245					250					255		
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cgg Arg	tac Tyr	acc Thr	acc Thr 20	gcc Ala	gcc Ala	ctc Leu	ctc Leu	ctc Leu 25	ctc Leu	acc Thr	ctc Leu	aca Thr	acg Thr 30	tgg Trp	tgc Cys	96
cac His	ttc Phe	gcc Ala 35	ttc Phe	cca Pro	gcc Ala	gcc `Ala	acc Thr 40	gcc Ala	aca Thr	ccc Pro	ggc Gly	ctc Leu 45	acc Thr	gcc Ala	gaa Glu	144
ato Met	cac His	tcc Ser	tac Tyr	aaa Lys	gt <i>c</i> Val	cca Pro	ctc Leu	ggt Gly	ctc Leu	acc Thr	gta Val	ttc Phe	tac Tyr	ctg Leu	ctg Leu	192

50 55 . 60

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gcg Ala	gcg Ala 130	Leu	cat His	agt Ser	GJA āāā	agc Ser 135	tcg Ser	tat Tyr	gcg Ala	gtg Val	tgg Trp 140	Val	cat His	tat Tyr	tgt Cys	432
gat Asp 145	Lys	tat Tyr	ttg Leu	gag Glu	ttc Phe 150	ttt Phe	gat Asp	acg Thr	tat Tyr	ttt Phe 155	atg Met	gtg Val	ttg Leu	agg Arg	Gly ggg	480
aaa Lys	atg Met	gac Asp	cag Gln	gtc Val 165	tcc Ser	ttc Phe	ctc Leu	cac	atc Ile 170	tac Tyr	cac His	cac	acg Thr	acc Thr 175	ata Ile	528
gcg Ala	tgg Trp	gca Ala	tgg Trp 180	tgg Trp	atc Ile	gcc Ala	ctc Leu	cgc Arg 185	ttc Phe	tcc Ser	ccc Pro	ggc Gly	gga Gly 190	Asp	att Ile	576
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GJĀ āāā	tgt Cys	acg Thr	ggt Gly	tat Tyr 245	act Thr	cat His	tac Tyr	tat Tyr	cat His 250	acg Thr	aag Lys	cat His	gga Gly	gcg Ala 255	gat Asp	768
gag Glu	aca Thr	cag Gln	cct Pro 260	agt Ser	tta Leu	gga Gly	acg Thr	tat Tyr 265	tat Tyr	ttc Phe	tgt Cys	tgt Cys	gga Gly 270	gtg Val	cag Gln	816
			atg Met												aaa Lys	· 864
cga Arg	tcc Ser 290	tạt Tyr	tcg Ser	aag Lys	aag Lys	aac Asn 295	aag Lys	tca Ser	gga Gly	gga Gly	aag Lys 300	gat Asp	agc Ser	aag Lys	aag Lys	912
			Gly ggg													960
ata Ile	tcg Ser	gag Glu	ggt Gly	gcg Ala	aag Lys	gag Glu	gtt Val	gtg Val	ggg Gly	cat His	gca Ala	gcg Ala	aag Lys	gat Asp	gct Ala	1008

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His Phe Ala Phe Pro Ala Ala Thr Ala Thr Pro Gly Leu Thr Ala Glu 35 40

Met His Ser Tyr Lys Val Pro Leu Gly Leu Thr Val Phe Tyr Leu Leu 50 55

Ser Leu Pro Ser Leu Lys Tyr Val Thr Asp Asn Tyr Leu Ala Lys Lys 65 70 75 80

Tyr Asp Met Lys Ser Leu Leu Thr Glu Ser Met Val Leu Tyr Asn Val 85 90 95

Ala Gln Val Leu Leu Asn Gly Trp Thr Val Tyr Ala Ile Val Asp Ala 100 105 110

Val Met Asn Arg Asp His Pro Phe Ile Gly Ser Arg Ser Leu Val Gly 115 120 125

Ala Ala Leu His Ser Gly Ser Ser Tyr Ala Val Trp Val His Tyr Cys 130 135 140

Asp Lys Tyr Leu Glu Phe Phe Asp Thr Tyr Phe Met Val Leu Arg Gly 145 150 155 160

Lys Met Asp Gln Val Ser Phe Leu His Ile Tyr His His Thr Thr Ile 165 170 175

Ala Trp Ala Trp Trp Ile Ala Leu Arg Phe Ser Pro Gly Gly Asp Ile 180 185 190

Tyr Phe Gly Ala Leu Leu Asn Ser Ile Ile His Val Leu Met Tyr Ser 195 200 205

Tyr.	Tyr 210	Ala	Leu	Ala	Leu	Leu 215	Lys	Val	Ser	Cys	Pro 220	Trp	Lys	Arg	Tyr		
Leu 225	Thr	Gln	Ala	Gln	Leu 230	Leu	Gln	Phe	Thr	Ser 235	Val	Val	Val	Tyr	Thr 240		
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Arg	Ser 290	Tyr	Ser	Lys		Asn 295	Lys	Ser	Gly	Gly	Lys	Ąsp	Ser	Lys	Lys		
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Ile	Ser	Glu	Gly	Ala 325	Lys	Glu	Val	Val	Gly 330	His	Ala	Ala	Lys	Asp 335			•
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cgg Arg	tcg Ser	cta Leu	cct Pro 20	aaa Lys	gac Asp	tgt Cys	ttc Phe	gag Glu 25	gct Ala	tcg Ser	gtg Val	cct Pro	ctg Leu 30	tcg Ser	ctc Leu		96
tac Tyr	tac Tyr	acc Thr 35	gtg Val	cgt Arg	tgt Cys	ctg Leu	gtg Val 40	atc Ile	gcg Ala	gtg Val	gct Ala	cta Leu 45	acc Thr	ttc Phe	ggt Gly	,	144
ctc Leu	aac Asn	tac Tyr	gct Ala	cgc Arg	gct Ala	ctg Leu	ccc Pro	gag Glu	gtc Val	gag Glu	agc Ser	ttc Phe	tgg Trp	gct Ala	.ctg Leu	,	192

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Tyr Tyr Thr Val Arg Cys Leu Val Ile Ala Val Ala Leu Thr Phe Gly 35 40

Leu Asn Tyr Ala Arg Ala Leu Pro Glu Val Glu Ser Phe Trp Ala Leu
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Asp Ala Ala Leu Cys Thr Gly Tyr Ile Leu Leu Gln Gly Ile Val Phe 65 70 75 80

Trp Gly Phe Phe Thr Val Gly His Asp Ala Gly His Gly Ala Phe Ser 85 90 95

Arg Tyr His Leu Leu Asn Phe Val Val Gly Thr Phe Met His Ser Leu 100 105 110

Ile Leu Thr Pro Phe Glu Ser Trp Lys Leu Thr His Arg His His His 115 120 125

Lys Asn Thr Gly Asn Ile Asp Arg Asp Glu Val Phe Tyr Pro Gln Arg 130 135 140

Lys Ala Asp Asp His Pro Leu Ser Arg Asn Leu Ile Leu Ala Leu Gly 145 150 155

Ala Ala Trp Leu Ala Tyr Leu Val Glu Gly Phe Pro Pro Arg Lys Val
165 170 175

Asn His Phe Asn Pro Phe Glu Pro Leu Phe Val Arg Gln Val Ser Ala 180 185 190

Val Val Ile Ser Leu Leu Ala His Phe Phe Val Ala Gly Leu Ser Ile 195 200 205

Tyr Leu Ser 210	Leu Gln Leu	Gly Leu Lys 215	Thr Met Ala 220	Ile Tyr Tyr	Tyr
Gly Pro Val 225	Phe Val Phe 230	Gly Ser Met	Leu Val Ile 235	Thr Thr Phe	Leu 240
His His Asn	Asp Glu Glu 245	Thr Pro Trp	Tyr Ala Asp 250	Ser Glu Trp 255	
Tyr Val Lys	Gly Asn Leu 260	Ser Ser Val 265	Asp Arg Ser	Tyr Gly Ala 270	Leu
Ile Asp Asn 275	Leu Ser His	Asn Ile Gly 280	Thr His Gln	Ile His His 285	Leu
Phe Pro Ile 290	Ile Pro His	Tyr Lys Leu 295	Lys Lys Ala 300	Thr Ala Ala	Phe
His Gln Ala 305	Phe Pro Glu 310	Leu Val Arg	Lys Ser Asp 315	Glu Pro Ile	11e 320
Lys Ala Phe	Phe Arg Val 325	Gly Arg Leu	Tyr Ala Asn 330	Tyr Gly Val	
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Thr Ala Met Gln Ser Tyr Gly Leu Phe Leu Ala Thr Ser Trp Val Ser

325 330 335 gge tge tat ctg ttt gea cac tte tee aeg teg cae aeg cae etg gat 1056 Gly Cys Tyr Leu Phe Ala His Phe Ser Thr Ser His Thr His Leu Asp 340 345 gtg gtg ccc gcg gac gag cat ctc tcc tgg gtt cga tac gcc gtc gat 1104 Val Val Pro Ala Asp Glu His Leu Ser Trp Val Arg Tyr Ala Val Asp 365 360 cac acg atc gac atc gat ccg agt caa ggt tgg gtg aac tgg ttg atg 1152 His Thr Ile Asp Ile Asp Pro Ser Gln Gly Trp Val Asn Trp Leu Met . 375 gge tac etc aac tge caa gte ate cae cae etc ttt eeg age atg eeg 1200 Gly Tyr Leu Asn Cys Gln Val Ile His His Leu Phe Pro Ser Met Pro 390 395 cag ttc cgc cag ccc gag gta tct cgc cgc ttc gtc gcc ttt gcg aaa 1248 Gln Phe Arg Gln Pro Glu Val Ser Arg Phe Val Ala Phe Ala Lys 405 410 aag tgg aac ctc aac tac aag gtc atg acc tac gcc ggt gcg tgg aag 1296 Lys Trp Asn Leu Asn Tyr Lys Val Met Thr Tyr Ala Gly Ala Trp Lys 420 gca acg ctc gga aac ctc gac aac gtg ggt aag cac tac tac gtg cac 1344 Ala Thr Leu Gly Asn Leu Asp Asn Val Gly Lys His Tyr Tyr Val His 440 445 ggc caa cac tcc gga aag acg gcg taa 1371 Gly Gln His Ser Gly Lys Thr Ala 450 455 <210> 90 <211> 456 <212> PRT <213> Ostreococcus tauri <400> 90 Met Cys Val Glu Thr Glu Asn Asp Gly Ile Pro Thr Val Glu Ile Ala Phe Asp Gly Glu Arg Glu Arg Ala Glu Ala Asn Val Lys Leu Ser 20 Ala Glu Lys Met Glu Pro Ala Ala Leu Ala Lys Thr Phe Ala Arg Arg Tyr Val Val Ile Glu Gly Val Glu Tyr Asp Val Thr Asp Phe Lys His Pro Gly Gly Thr Val Ile Phe Tyr Ala Leu Ser Asn Thr Gly Ala Asp 65 70 Ala Thr Glu Ala Phe Lys Glu Phe His His Arg Ser Arg Lys Ala Arg Lys Ala Leu Ala Ala Leu Pro Ser Arg Pro Ala Lys Thr Ala Lys Val 105

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Glu Arg Asp Gly Phe Phe Lys Pro Ser Pro Ala His Val Ala Tyr Arg 130 135 140

Phe Ala Glu Leu Ala Ala Met Tyr Ala Leu Gly Thr Tyr Leu Met Tyr 145 150 155 160

Ala Arg Tyr Val Val Ser Ser Val Leu Val Tyr Ala Cys Phe Phe Gly 165 170 175

Ala Arg Cys Gly Trp Val Gln His Glu Gly Gly His Ser Ser Leu Thr 180 185 190

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Gly Leu Ala Gly Ser Gly Asp Met Trp Asn Ser Met His Asn Lys His 210 215 220

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Pro Ala Val Ala Phe Phe Asn Thr Ala Val Glu Asp Asn Arg Pro Arg 245 250 255

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Val Thr Ser Gly Leu Val Leu Leu Phe Trp Met Phe Phe Leu His Pro 275 280 285

Ser Lys Ala Leu Lys Gly Gly Lys Tyr Glu Glu Leu Val Trp Met Leu 290 295 300

Ala Ala His Val Ile Arg Thr Trp Thr Ile Lys Ala Val Thr Gly Phe 305 310 315 320

Thr Ala Met Gln Ser Tyr Gly Leu Phe Leu Ala Thr Ser Trp Val Ser 325 330 335

Gly Cys Tyr Leu Phe Ala His Phe Ser Thr Ser His Thr His Leu Asp 340 345 350

Val Val Pro Ala Asp Glu His Leu Ser Trp Val Arg Tyr Ala Val Asp 355 360 365

His Thr Ile Asp Ile Asp Pro Ser Gln Gly Trp Val Asn Trp Leu Met 370 380

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tt Pl	ic to	er Gl	ga gg .y Gl	c tta y Le	a aad u Asi	tac n Tyr	ca Gl	a gte n Va	c gt l Va	c ca l Hi	c ca s Hi	t ct s Le	c tto u Ph	c cc e Pr	g ggc o Gly	432

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Arg Ser Thr Ser 50	Glu Lys Gly 55	Ser Ala Leu	Val Leu Gl 60	u Arg Glu S	Ser
Glu Arg Glu Lys 65	Glu Glu Gly 70	Gly Lys Ala	Arg Ala Gl 75	-	Arg 30
Phe Gln Arg Pro	Asp Val Ala 85	Ala Pro Gly 90	Gly Ala As	p Pro Trp A 95	Asn
Asp Glu Lys Trp 100	_	Lys Trp Thr 105	Val Phe Ar	g Asp Val A	Ala
Tyr Asp Leu Asp 115	Pro Phe Phe	Ala Arg His 120	Pro Gly Gl		Seu

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Tyr Ser Leu Pro Gly Val Pro Phe Arg Leu Pro Pro Arg Val Ser Arg 225 230 235 240

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Met Ser Pro Ser Pro Ala Val Asn Gly Val Leu Gly Leu Thr Asn Asp 260 265 270

Leu Ile Gly Gly Ser Ser Leu Met Trp Arg Tyr His His Gln Val Ser 275 280 285

His His Ile His Cys Asn Asp Asn Ala Met Asp Gln Asp Val Tyr Thr 290 295 300

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Val Ala Phe Gln Val Gly Asp Ile Ala Ala Leu Phe Thr Arg Asp Thr 340 345 350

Glu Gly Ala Lys Leu His Gly Ala Thr Thr Trp Glu Leu Thr Thr Val 355 360 365

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Asn His Ala Val Ser Ser Val Leu Leu Gly Ile Val Gly Phe Met Ala 385 390 395 400

Cys Gln Gly Ile Val Leu Ala Cys Thr Phe Ala Val Ser His Asn Val 405 410 415

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Ser Ser Lys Met Tyr Tyr Ala Tyr Lys Cys Ser Phe Asn Met Cys Met 130 135 140

Trp Leu Val Ala Val Ala Met Val Tyr Tyr Ser Asp Ser Leu Ala Met 145 150 155 160

His Ile Gly Ser Ala Leu Leu Leu Gly Leu Phe Trp Gln Gln Cys Gly 165 170 175

Trp Leu Ala His Asp Phe Leu His His Gln Val Phe Lys Gln Arg Lys 180 185

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Ser Met Gln Trp Trp Lys Asn Lys His Asn Gly His His Ala Val Pro 210 215 220

Asn Leu His Asn Ser Ser Leu Asp Ser Gln Asp Gly Asp Pro Asp Ile 225 230 235 240

Arg Glu Ile Asn Lys Gly Lys Asp Ser Thr Phe Val Lys Tyr Ala Ile 260 265 270

Lys Phe Gln Ala Phe Thr Tyr Phe Pro Ile Leu Leu Leu Ala Arg Ile 275 280 285

Ser Trp Leu Asn Glu Ser Phe Lys Thr Ala Phe Gly Leu Gly Ala Ala 290 295 300

Ser Glu Asn Ala Lys Leu Glu Leu Glu Lys Arg Gly Leu Gln Tyr Pro 305 310 315 320

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Phe Phe Thr Ala Thr Cys Ser Ser Gly Leu Phe Leu Ala Leu Val Phe 355 360 365

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Ser Ser Glu Pro Met Phe Ala Phe Asn Asp Tyr Pro Ile Gly His Pro 245 250 255

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Phe Ile Val Lys Arg Arg Lys Tyr Ala Val Ala Leu Arg Met Met Tyr 305 310 315 320

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Ser Thr Phe Gly Ile Ile Met Leu Met Gly Ile Ser Glu Ser Leu Thr 340 345 350

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Asp Pro Thr Ala Asp Phe Lys Lys Thr Gly Glu Gln Val Cys Trp Phe 370 375 380

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Phe Gln Met Glu Asn Asp Phe Ile Val Lys Arg Arg Lys Tyr Ala Met 305 310 315

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Asn Asn Gly Leu Thr Trp Ser Thr Val Gly Ile Ile Leu Leu Met Gly 340 345 350

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Gly Met Gly Thr Phe Ala Ala Phe Ile Gly Thr Cys Ile Gln His Asp 195 200 205

Gly Asn His Gly Ala Phe Ala Gln Asn Lys Leu Leu Asn Lys Leu Ala 210 215 220

Gly Trp Thr Leu Asp Met Ile Gly Ala Ser Ala Phe Thr Trp Glu Leu 225 230 235 240

Gln His Met Leu Gly His His Pro Tyr Thr Asn Val Leu Asp Gly Val 245 250 255

Glu Glu Glu Arg Lys Glu Arg Gly Glu Asp Val Ala Leu Glu Glu Lys 260 265 270

Asp Gln Asp Phe Glu Val Ala Thr Ser Gly Arg Leu Tyr His Ile Asp 275 280 285

Ala Asn Val Arg Tyr Gly Ser Val Trp Asn Val Met Arg Phe Trp Ala 290 295 300

Met Lys Val Ile Thr Met Gly Tyr Met Met Gly Leu Pro Ile Tyr Phe 305 310 315

His Gly Val Leu Arg Gly Val Gly Leu Phe Val Ile Gly His Leu Ala 325 330 335

Cys Gly Glu Leu Leu Ala Thr Met Phe Ile Val Asn His Val Ile Glu 340 345 350

Gly Val Ser Tyr Gly Thr Lys Asp Leu Val Gly Gly Ala Ser His Val 355 360 365

Asp Glu Lys Lys Ile Val Lys Pro Thr Thr Val Leu Gly Asp Thr Pro 370 375 380

Met Val Lys Thr Arg Glu Glu Ala Leu Lys Ser Asn Ser Asn Asn Asn 385 390 395 400

Lys Lys Lys Gly Glu Lys Asn Ser Val Pro Ser Val Pro Phe Asn Asp 405 410 415

Trp Ala Ala Val Gln Cys Gln Thr Ser Val Asn Trp Ser Pro Gly Ser 420 425 430

Trp Phe Trp Asn His Phe Ser Gly Gly Leu Ser His Gln Ile Glu His
435 440 445

His Leu Phe Pro Ser Ile Cys His Thr Asn Tyr Cys His Ile Gln Asp 450 455 460	
Val Val Glu Ser Thr Cys Ala Glu Tyr Gly Val Pro Tyr Gln Ser Glu 465 470 475 480	
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gtc aac act cca cca aga gca ggt acc atc atg aag atg ttg ccg aag Val Asn Thr Pro Pro Arg Ala Gly Thr Ile Met Lys Met Leu Pro Lys 65 70 75 80	10
gaa acg ttc aac att gat aca gca act tca ttg ggt tac ttt ggt atg Glu Thr Phe Asn Ile Asp Thr Ala Thr Ser Leu Gly Tyr Phe Gly Met 85 90 95	38
gat atg gca gcg gtt gta tcg tcc atg acg ttg cta aat gct att gta Asp Met Ala Ala Val Val Ser Ser Met Thr Leu Leu Asn Ala Ile Val 100 105 110	36
act tcg gat cag tac cat gct ctt cca ctt cct ctc caa gca gca aca Thr Ser Asp Gln Tyr His Ala Leu Pro Leu Pro Leu Gln Ala Ala Thr 115 120 125	34
gtg att ccc ttt cag cta ttg gct ggg ttc gcc atg tgg tgt atg tgg Val Ile Pro Phe Gln Leu Leu Ala Gly Phe Ala Met Trp Cys Met Trp 130 135 140	32
tgc att gga cac gat gct gga cat tct act gtt tcg aag aca aag tgg Cys Ile Gly His Asp Ala Gly His Ser Thr Val Ser Lys Thr Lys Trp	в0

14	5				150	•				155	j				160	
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aa As:	t cat n His	att Ile 195	Glu	aag Lys	gac Asp	tac Tyr	tct Ser 200	His	aag Lys	tgg Trp	tac Tyr	Ser 205	Arg	gac Asp	gag Glu	624
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ate Me 22	g atg t Met	caa Gln	ctt Leu	cca Pro	ttc Phe 230	Leu	tac Tyr	ttc Phe	atg Met	tat Tyr 235	Leu	gca Ala	ttg Leu	gga	att Ile 240	720
Pro	a gat o Asp	Gly	Gly aaa	cat His 245	Val	gtg Val	ttc Phe	tac Tyr	gga Gly 250	aga Arg	atg Met	tgg Trp	gaa Glu	gga Gly 255	Val	768
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gto Val	gta Val 290	tgc Cys	atg Met	gtt Val	cct Pro	tgg Trp 295	cta Leu	gtt Val	cta Leu	tcg Ser	tgg Trp 300	tgg Trp	ctc Leu	ttc Phe	atg Met	912
gta Val 305	aca Thr	tac Tyr	ctt Leu	cag Gln	cat His 310	cat His	tca Ser	gaa Glu	gac Asp	gga Gly 315	aag Lys	cta Leu	tac Tyr	act Thr	gat Asp 320	960
Glu	acg Thr	Phe	Thr	Phe 325	Glu	Lys	Gly	Ala	Phe 330	Glu	Thr	Val	qzA	Arg 335	Ser	1008
Tyr	. GJĀ aāc	Lys	ttg Leu 340	atc Ile	aac Asn	cga Arg	atg Met	tcg Ser 345	His	cac His	atg Met	atg Met	gac Asp 350	ggt Gly	cac His	1056
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cat His 385	ttg Leu	tac Tyr	aaa Lys	tac Tyr	att Ile 390	gat Asp	act Thr	cct Pro	gat Asp	ttc Phe 395	aat Asn	gcc Ala	gag Glu	att Ile	gtc Val 400	1200
aac Asn	gga Gly	ttt Phe	Arg	gac Asp 405	aat Asn	tgg Trp	ttc Phe	Leu	gtt Val 410	gaa Glu	gag Glu	gag Glu	aac Asn	atc Ile 415	Lys	1248
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Ser Lys Val Gln Ser Thr Val Leu Pro Ile Pro Thr Lys Asp Asp Leu

Asn Phe Leu Gln Pro Gln Leu Asp Glu Asn Asp Leu Tyr Leu Asp Asp 55

Val Asn Thr Pro Pro Arg Ala Gly Thr Ile Met Lys Met Leu Pro Lys

Glu Thr Phe Asn Ile Asp Thr Ala Thr Ser Leu Gly Tyr Phe Gly Met 90 . 85

Asp Met Ala Ala Val Val Ser Ser Met Thr Leu Leu Asn Ala Ile Val

Thr Ser Asp Gln Tyr His Ala Leu Pro Leu Pro Leu Gln Ala Ala Thr 125 120 115

Val Ile Pro Phe Gln Leu Leu Ala Gly Phe Ala Met Trp Cys Met Trp 130

Cys Ile Gly His Asp Ala Gly His Ser Thr Val Ser Lys Thr Lys Trp

Ile Asn Arg Val Val Gly Glu Val Ala His Ser Val Val Cys Leu Thr

Pro Phe Val Pro Trp Gln Met Ser His Arg Lys His His Leu Asn His 185

Asn His Ile Glu Lys Asp Tyr Ser His Lys Trp Tyr Ser Arg Asp Glu 200

Phe Asp Asp Ile Pro Gln Leu Tyr Lys Thr Phe Gly Tyr Asn Pro Arg 220 210

Met Met Gln Leu Pro Phe Leu Tyr Phe Met Tyr Leu Ala Leu Gly Ile 225 230 235 240

Pro Asp Gly Gly His Val Val Phe Tyr Gly Arg Met Trp Glu Gly Val 250 255

Ser Leu Gln Lys Lys Phe Asp Ala Ala Ile Ser Val Ala Val Ser Cys 265 270

Ala Thr Ala Gly Ser Leu Trp Met Asn Met Gly Thr Ala Asp Phe Thr 275 280

Val Val Cys Met Val Pro Trp Leu Val Leu Ser Trp Trp Leu Phe Met 295 - 300

Val Thr Tyr Leu Gln His His Ser Glu Asp Gly Lys Leu Tyr Thr Asp 305 315

Glu Thr Phe Thr Phe Glu Lys Gly Ala Phe Glu Thr Val Asp Arg Ser

Tyr Gly Lys Leu Ile Asn Arg Met Ser His His Met Met Asp Gly His 340 345

Val Val His His Leu Phe Phe Glu Arg Val Pro His Tyr Arg Leu Glu 360 355

Ala Ala Thr Glu Ala Leu Val Lys Gly Met Asp Glu Thr Gly Gln Lys

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	tac ttt tct tg Tyr Phe Ser Tr 100		Ser His Ala		
	cac gtt ctt ga His Val Leu Gl				_
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	tac ttg ctc ac Tyr Leu Leu Th 165				Gly
	cac ttc tta co His Phe Leu Pr 180		: Gly Glu Lys		
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	gtg atg gca ct Val Met Ala Le 230				
	gtc ttg tac ac Val Leu Tyr Th 245		•		Val
_	gag ggc gac ga Glu Gly Asp As 260		Leu Val Lys		-
	cgc ccg tac gg Arg Pro Tyr Gl				
	acg cac gtc gc Thr His Val Al				

172 290 295 300 tac aag gct caa atg gcg acg gat gcg cta aag gag gcg tat ccc gac 960 Tyr Lys Ala Gln Met Ala Thr Asp Ala Leu Lys Glu Ala Tyr Pro Asp 310 315 etc tac ett tac gat eca act eeg ate geg ace get aeg tgg ege gtg 1008 Leu Tyr Leu Tyr Asp Pro Thr Pro Ile Ala Thr Ala Thr Trp Arg Val 325 330 ggg agc aag tgc atc gcc gtc gtg aag aag gga gac gaa tgg gtg ttc 1056 Gly Ser Lys Cys Ile Ala Val Val Lys Lys Gly Asp Glu Trp Val Phe 345 acg gat aag caa ctc ccg gtc gcg gcg tga 1086 Thr Asp Lys Gln Leu Pro Val Ala Ala 355 <210> 108 <211> 361 <212> PRT <213> Ostreococcus tauri <400> 108 Met Glu Glu Gly Val Arg Asn Ile Pro Asn Glu Cys Phe Glu Thr Gly His Leu Glu Arg Pro Trp Arg Ser Gly Arg Cys Gly Arg Asp Pro Gly 20 25 Ser Asn Trp Gly Ala Gly Phe Arg Phe Phe Ser Leu Lys Gly Phe Trp Trp Pro Ala Trp Trp Ala Tyr Ala Phe Val Thr Gly Thr Ala Ala Thr Gly Cys Trp Val Ala Ala His Glu Cys Gly His Gly Ala Phe Ser Asp Asn Lys Thr Leu Gln Asp Ala Val Gly Tyr Val Leu His Ser Leu Leu 85 90 Leu Val Pro Tyr Phe Ser Trp Gln Arg Ser His Ala Val His His Ser 100 Arg Thr Asn His Val Leu Glu Gly Glu Thr His Val Pro Ala Arg Leu . 115 120 Gly Thr Glu Asp Ala Asn Val Val Phe Lys Leu Arg Glu Leu Ile Gly 130 135 Glu Gly Pro Phe Thr Phe Phe Asn Leu Val Gly Val Phe Ala Leu Gly 145 150 Trp Pro Ile Tyr Leu Leu Thr Gly Ala Ser Gly Gly Pro Val Arg Gly

Asn Thr Asn His Phe Leu Pro Phe Met Gly Glu Lys Gly Lys His Ala 185 Leu Phe Pro Gly Lys Trp Ala Lys Lys Val Trp Gln Ser Asp Ile Gly 200 _. 205 Val Val Ala Val Leu Gly Ala Leu Ala Ala Trp Ala Ala His Ser Gly 215 Ile Ala Thr Val Met Ala Leu Tyr Val Gly Pro Tyr Met Val Thr Asn Phe Trp Leu Val Leu Tyr Thr Trp Leu Gln His Thr Asp Val Asp Val 245 250 Pro His Phe Glu Gly Asp Asp Trp Asn Leu Val Lys Gly Ala Phe Met 265 Thr Ile Asp Arg Pro Tyr Gly Pro Val Phe Asp Phe Leu His His Arg Ile Gly Ser Thr His Val Ala His His Ile Asn Thr Pro Phe Pro His 295 Tyr Lys Ala Gln Met Ala Thr Asp Ala Leu Lys Glu Ala Tyr Pro Asp 305 310 315 Leu Tyr Leu Tyr Asp Pro Thr Pro Ile Ala Thr Ala Thr Trp Arg Val 325 Gly Ser Lys Cys Ile Ala Val Val Lys Lys Gly Asp Glu Trp Val Phe Thr Asp Lys Gln Leu Pro Val Ala Ala 355 360 <210> 109 <211> 1305 <212> DNA <213> Thalassiosira pseudonana <220> <221> CDS <222> (1)..(1305) <223> Delta-12-Desaturase <400> 109 48 atg gga aag gga aga tca gta acc cgc gct caa aca gca gaa aag Met Gly Lys Gly Gly Arg'Ser Val Thr Arg Ala Gln Thr Ala Glu Lys 10 tca gca cac acc atc caa acc ttc acc gac ggc cga tgg gtc tcc ccc 96

Ser Ala His Thr Ile Gln Thr Phe Thr Asp Gly Arg Trp Val Ser Pro

tac aac ccc ctc gca aaa gat gca cct gaa ctc ccc tcc aag ggt gaa 144 Tyr Asn Pro Leu Ala Lys Asp Ala Pro Glu Leu Pro Ser Lys Gly Glu 192 atc aag gcg gtc atc ccc aaa gag tgc ttc gaa cga agc tac ctc cac Ile Lys Ala Val Ile Pro Lys Glu Cys Phe Glu Arg Ser Tyr Leu His 55 tee atg tae tte gte etc egt gae ace gte atg gee gtg gee tge gee 240 Ser Met Tyr Phe Val Leu Arg Asp Thr Val Met Ala Val Ala Cys Ala tac atc gcc cac tca acg ctc tcc acc gat att ccc tcc gag tta ctg 288 Tyr Ile Ala His Ser Thr Leu Ser Thr Asp Ile Pro Ser Glu Leu Leu 90 336 age gtg gae gea etc aaa tgg tte etc gga tgg aac aec tae gee ttt Ser Val Asp Ala Leu Lys Trp Phe Leu Gly Trp Asn Thr Tyr Ala Phe 100 105 110 tgg atg ggg tgc att ctc acc gga cac tgg gtc cta gcc cat gaa tgt 384 Trp Met Gly Cys Ile Leu Thr Gly His Trp Val Leu Ala His Glu Cys 115 -120 gga cat ggt gca ttc tct ccc tct cag acg ttt aat gac ttt tgg ggg 432 Gly His Gly Ala Phe Ser Pro Ser Gln Thr Phe Asn Asp Phe Trp Gly 135 140 480 ttc att atg cat cag gcg gtg ttg gtt ccg tat ttc gcc tgg cag tac Phe Ile Met His Gln Ala Val Leu Val Pro Tyr Phe Ala Trp Gln Tyr 150 tot cat gog aag cat cat cga cgt acc aac att atg gat ggg gag 528 Ser His Ala Lys His His Arg Arg Thr Asn Asn Ile Met Asp Gly Glu 165 170 age cat gtg ccc aat ate gcc aag gaa atg gga ttg aac gag aag aat' 576 Ser His Val Pro Asn Ile Ala Lys Glu Met Gly Leu Asn Glu Lys Asn gag cgc agt gga gga tat gcc gcc att cat gag gct att gga gat gga 624 Glu Arg Ser Gly Gly Tyr Ala Ala Ile His Glu Ala Ile Gly Asp Gly 195 200 672 ccc ttt gcg atg ttt caa atc ttt gct cac ttg gtg atc ggg tgg cct Pro Phe Ala Met Phe Gln Ile Phe Ala His Leu Val Ile Gly Trp Pro 210 215 720 att tac ttg atg gga ttt gct tcc act gga cgt ctc ggt cag gat ggg Ile Tyr Leu Met Gly Phe Ala Ser Thr Gly Arg Leu Gly Gln Asp Gly 235 aag gaa ctt cag gct gga gag atc atc gac cat tac cgt cct tgg agt 768 Lys Glu Leu Gln Ala Gly Glu Ile Ile Asp His Tyr Arg Pro Trp Ser 250 aag atg ttc ccc acc aag ttg cga ttc aaa att gct ctt tcg aca ctt 816 Lys Met Phe Pro Thr Lys Leu Arg Phe Lys Ile Ala Leu Ser Thr Leu 864 gga gtg att gcc gcc tgg gtt ggg ttg tac ttt gct gca caa gag tat Gly Val Ile Ala Ala Trp Val Gly Leu Tyr Phe Ala Ala Gln Glu Tyr 275 280 gga gtc ttg ccc gtg gtt ctt tgg tac att ggc cca ctc atg tgg aat 912 Gly Val Leu Pro Val Val Leu Trp Tyr Ile Gly Pro Leu Met Trp Asn

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:	290					295 300										
cag q Gln 2 305																960
gtg o																1008
tcg a	~			-	-					-					_	1056
att (1104
tac a																1152
aag Lys (385																1200
agg (1248
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Tyr .	Asn	Pro 35	Leu	Ala	Lys	Asp	Ala 40	Pro	Glu	Leu	Pro	Ser 45	Lys	Gly	Glu	
Ile	Lys 50	Ala	Val	Ile	Pro	Lys 55	Glu	Cys	Phe	.Glu	Arg 60	Ser	Tyr	Leu	His	
Ser 1	Met	Tyr	Phe	Val	Leu 70	Arg	Asp	Thr	Val	Met 75	Ala	Val	Ala	Cys	Ala 80	
Tyr	Ile	Ala	His	Ser 85	Thr	Leu	Ser	Thr	Asp 90	I,le	Pro	Ser	Glu	Leu 95	Leu	

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- Trp Met Gly Cys Ile Leu Thr Gly His Trp Val Leu Ala His Glu Cys 115 120 125
- Gly His Gly Ala Phe Ser Pro Ser Gln Thr Phe Asn Asp Phe Trp Gly
 130 140
- Phe Ile Met His Gln Ala Val Leu Val Pro Tyr Phe Ala Trp Gln Tyr 145 150 155 160
- Ser His Ala Lys His His Arg Arg Thr Asn Asn Ile Met Asp Gly Glu 165 170 175
- Ser His Val Pro Asn Ile Ala Lys Glu Met Gly Leu Asn Glu Lys Asn 180 185 190
- Glu Arg Ser Gly Gly Tyr Ala Ala Ile His Glu Ala Ile Gly Asp Gly 195 200 205
- Pro Phe Ala Met Phe Gln Ile Phe Ala His Leu Val Ile Gly Trp Pro 210 215 220
- Ile Tyr Leu Met Gly Phe Ala Ser Thr Gly Arg Leu Gly Gln Asp Gly 225 230 235
- Lys Glu Leu Gln Ala Gly Glu Ile Ile Asp His Tyr Arg Pro Trp Ser 245 250 255
- Lys Met Phe Pro Thr Lys Leu Arg Phe Lys Ile Ala Leu Ser Thr Leu 260 265 270
- Gly Val Ile Ala Ala Trp Val Gly Leu Tyr Phe Ala Ala Gln Glu Tyr 275 280 285
- Gly Val Leu Pro Val Val Leu Trp Tyr Ile Gly Pro Leu Met Trp Asn 290 295 300
- Gln Ala Trp Leu Val Leu Tyr Thr Trp Leu Gln His Asn Asp Pro Ser 310 315 320
- Val Pro Gln Tyr Gly Ser Asp Glu Trp Thr Trp Val Lys Gly Ala Leu 325 330 335
- Ser Thr Ile Asp Arg Pro Tyr Gly Ile Phe Asp Phe Phe His His Lys 340 345 350
- Ile Gly Ser Thr His Val Ala His His Leu Phe His Glu Met Pro Phe 355 360 365

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Arg	Val	Ala	Lys	Thr 405	Cys	His	Tyr	Ile	Glu 410	Ąsp	Val	Asp	Gly	Val 415	Gln	·
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		tcc Ser														192
		ttc Phe														240
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		ata Ile														336
		cag Gln 115														384
		cag Gln														432

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														tat Tyr			624
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Gln	Trp	Asp 35	Ile	Gly	Pro	Val	Ser 40	Ser	Ser	Thr	Ala	His 45	Leu	Pro	Ala		
Ile	Glu 50	Ser	Pro	Thr	Pro	Leu 55	Val	Thr	Ser	Leu	Leu 60	Phe	Tyr	Leu	Val	•	
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Ile Arg Glu Pro Thr Trp Leu Arg Arg Phe Ile Ile Cys His Asn Ala

Phe Leu Ile Val Leu Ser Leu Tyr Met Cys Leu Gly Cys Val Ala Gln

Ala Tyr Gln Asn Gly Tyr Thr Leu Trp Gly Asn Glu Phe Lys Ala Thr 120

Glu Thr Gln Leu Ala Leu Tyr Ile Tyr Ile Phe Tyr Val Ser Lys Ile

Tyr Glu Phe Val Asp Thr Tyr Ile Met Leu Leu Lys Asn Asn Leu Arg

Gln Val Ser Phe Leu His Ile Tyr His His Ser Thr Ile Ser Phe Ile 170 1.65

Trp Trp Ile Ile Ala Arg Arg Ala Pro Gly Gly Asp Ala Tyr Phe Ser

Ala Ala Leu Asn Ser Trp Val His Val Cys Met Tyr Thr Tyr Tyr Leu

Leu Ser Thr Leu Ile Gly Lys Glu Asp Pro Lys Arg Ser Asn Tyr Leu

Trp Trp Gly Arg His Leu Thr Gln Met Gln Met Leu Gln Phe Phe Phe 230 235

Asn Val Leu Gln Ala Leu Tyr Cys Ala Ser Phe Ser Thr Tyr Pro Lys 250

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					acg Thr												192
					aag Lys 70												240
					tat Tyr											· •	288
_			_		atc Ile	-		_		_			_	-			336
					gat Asp	Arg											384
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Phe Ile His Ile Val Met Tyr Ser Tyr Tyr Leu Met Ser Ala Leu Gly 200

Ile Arg Cys Pro Trp Lys Arg Tyr Ile Thr Gln Ala Gln Met Leu Gln 215 220

Phe Val Ile Val Phe Ala His Ala Val Phe Val Leu Arg Gln Lys His 235 230

Cys Pro Val Thr Leu Pro Trp Ala Gln Met Phe Val Met Thr Asn Met 245 250

Leu Val Leu Phe Gly Asn Phe Tyr Leu Lys Ala Tyr Ser Asn Lys Ser 265 260 270

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Xaa an der Position 3, 4, 5 und 6 in der Sequenz hat die in Tabel le A wiedergegebene Bedeutung.

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<210> 117

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tgg a	att Ile	aaa Lys	gat Asp 20	gct Ala	gat Asp	cct Pro	agg Arg	gtt Val 25	gaa Glu	gac Asp	tgg Trp	cca Pro	ctc Leu 30	atg Met	tcc Ser	96
tct (Ser)	cct Pro	atc Ile 35	cta Leu	caa Gln	acc Thr	atc Ile	atc Ile 40	atc Ile	ggc Gly	gct Ala	tac Tyr	atc Ile 45	tac Tyr	ttt Phe	gtc Val	144
aca Thr	tca Ser 50	ttg Leu	ggc Gly	cca Pro	agg Arg	atc Ile 55	atg Met	gag Glu	aac Asn	agg Arg	aag Lys 60	ccg Pro	ttt Phe	gct Ala	ctg Leu	192
aag Lys 65	gag Glu	atc Ile	atg Met	gca Ala	tgt Cys 70	tac Tyr	aac Asn	tta Leu	ttc Phe	atg Met 75	gtt Val	ctg Leu	ttt Phe	tct Ser	gtg Val 80	240
tac Tyr	atg Met	tgc Cys	tat Tyr	gag Glu 85	ttt Phe	ctc Leu	atg Met	tcg Ser	ggc Gly 90	tgg Trp	gct Ala	act Thr	gga Gly	tat Tyr 95	tcc Ser	288
Phe	Arg	Cys	Asp 100	Ile	Val	Asp	Tyr	Ser 105	Gln	Ser	ect. Pro	Gln	Ala 110	Leu	Arg	336
Met	Ala	Trp 115	Thr	Cys	Trp	Leu	Phe 120	Tyr	Phe	Ser	aag Lys	Phe 125	IIe	Glu	Leu	384
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Phe 225	Phe	Ph∈	Met	: Glu	230	Cys)	Pro	туг	: Glr	235	Pro	Val	. Pne	e Leu	tat Tyr 240	720
gtc Val	att Ile	tgg Trp	cto Le	g tac ı Tyı	Gl Gg	tto Phe	gtt Val	tto L Phe	tta Lev	ato ı Ile	ttg Lev	tto Phe	c cto e Lev	c aac ı Ası	ttc Phe	768

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Leu Pro Gly Tyr Asn Phe Ala Leu Val Ala Leu Asn Tyr Tyr Ile Leu 65 70 75 80

Gln Glu Val Val Thr Gly Ser Tyr Gly Ala Gly Tyr Asp Leu Val Cys 85 90 95

Thr Pro Leu Arg Ser Asp Ser Tyr Asp Pro Asn Glu Met Lys Val Ala 100 105 110

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Lys Trp Val Pro Gly Gly Gln Ser Phe Val Gly Ile Ile Leu Asn Ser 165 170 175

Ser Val His Val Ile Met Tyr Thr Tyr Tyr Gly Leu Ser Ala Leu Gly 180 185 190

Pro His Met Gln Lys Phe Leu Trp Trp Lys Lys Tyr Ile Thr Met Leu 195 200 205

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Val	Ala	Ser 35	Val	Ala	Tyr	Leu	Gly 40	Ala	Ile	Gly	Leu	Leu 45	Lys	Arg	Arg		
	Gly 50	Pro	Glu	Val	Arg	Ser 55	ГЛЗ	Pro	Phe	Glu	Leu 60	Leu	His	Asn	Gly		
Leu 65	Leu	Val	Gly	Trp	Ser 70	Leú	Val	Val	Leu	Leu 75 _.	Gly	Thr	Leu	Tyr	Gly 80		
Ala	Phe	Gln	Arg	Val 85	Gln	Glu	Asp	Gly	Arg 90	Gly	Val	Gln	Ala	Leu 95	Leu		
Суѕ	Thr	Gln	Arg 100	Pro	Pro	Ser	Gln	Ile 105	Trp	Ąsp	Gly	Pro	Val 110	Gly	Tyr		
Phe	Thr	Туг 115	Leu	Phe	Tyr	Leu	Ala 120	Lys	Туr	Trp	Glu	Leu 125	Ala	Asp	Thr		
Val	Ile 130	Leu	Ala	Leu	Arg	Gln 135	Lys	Pro	Thr	Ile	Pro 140	Leu	His	Val	Tyr		

His 145	His	Ala	Val	Met	Leu 150	Phe	Ile	Val	Trp	Ser 155	Trp	Phe	Ala	His	Pro 160		
Trp	Leu	Glu	_	Ser 165	Trp	Trp	Cys	Ser	Leu 170	Val	Asn	Ser	Phe	Ile 175	His		
Thr	Val	Met	Tyr 180	Ser	туг	Туг	Thr	Leu 185	Thr	Val	Val	Gly	Ile 190	Asn	Pro		
Trp	Trp	Lys 195	Lys	Trp	Met	Thr	Thr 200	Met	Gln	Ile	Ile	Gln 205	Phe	Ile	Thr		
Gly	Cys 210	Val	Туг	Val	Met	Ala 215	Phe	Phe	Gly	Leu	Tyr 220	Туг	Ala	Gly	Ala		
Gly 225	Cys	Thr	Ser	Asn	Val 230	Tyr	Thr	Ala	Trp	Phe 235	Ser	Met	Gly	Val	Asn 240		
Leu	Ser	Phe	Leu	Trp 245	Leu	Phe	Ala	Leu	Phe 250	Phe	Arg	Arg	Ser	Тут 255	Ser	٠.	
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cac His	tgg Trp	gac Asp	cct Pro 20	gcc Ala	acc Thr	acc Thr	ccg Pro	ctc Leu 25	gca Ala	tcg Ser	atc Ile	gtc Val	agc Ser 30	ccc Pro	tgt Cys		96
	Ala				tac Tyr												144
act Thr	gga Gly 50	ccg Pro	gag Glu	gtc Val	cgc Arg	tcc Ser 55	aag Lys	ccc Pro	ttc Phe	gag Glu	ctg Leu 60	cta Leu	cac His	aac Asn	GJÀ āāā		192
ctg Leu 65	ctg Leu	gtg Val	ggc Gly	tgg Trp	tcc Ser 70	ctc Leu	gtg Val	gtg Val	ctg Leu	ctc Leu 75	GJA aaa	acg Thr	ctg Leu	tac Tyr	80 Gly ggc		240
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193	
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Cys Thr Gln Arg Pro Pro Ser Gln Ile Trp Asp Gly Pro Val Gly Tyr
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Trp Leu Glu Gly Ser Trp Trp Cys Ser Leu Val Asn Ser Phe Ile His 165 170 175

Thr Val Met Tyr Ser Tyr Tyr Thr Leu Thr Val Val Gly Ile Asn Pro 180 185 190

Trp Trp Lys Lys Trp Met Thr Thr Met Gln Ile Ile Gln Phe Ile Thr 195 200 205

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	aag Lys	atc Ile	gaa Glu 275	ı Ser	ttt Phe	ata Ile	ttt Phe	att 11e	: His	gga Gly	gag Glu	agg Arg	tgg Trp 285	Ala	aat Asn	aaa Lys	864

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Leu Leu Arg Tyr Thr Val Asp Ser Leu Pro Thr Leu Gly Pro Arg Ile 50 55 60

Leu Lys Pro Ile Thr Ala Val His Ser Leu Ile Leu Phe Leu Leu Ser 65 70 75 80

Leu Thr Met Ala Val Gly Cys Thr Leu Ser Leu Ile Ser Ser Ser Asp 85 90 95

Pro Lys Ala Arg Leu Phe Asp Ala Val Cys Phe Pro Leu Asp Val Lys 100 105 110

Pro Lys Gly Pro Leu Phe Phe Trp Ala Gln Val Phe Tyr Leu Ser Lys 115 120 125

Ile Leu Glu Phe Val Asp Thr Leu Leu Ile Ile Leu Asn Lys Ser Ile 130 135 140

Gln Arg Leu Ser Phe Leu His Val Tyr His His Ala Thr Val Val Ile 145 150 155

Leu Cys Tyr Leu Trp Leu Arg Thr Arg Gln Ser Met Phe Pro Val Gly 165 170 175

Leu Val Leu Asn Ser Thr Val His Val Ile Met Tyr Gly Tyr Tyr Phe 180 185 190

Leu Cys Ala Ile Gly Ser Arg Pro Lys Trp Lys Lys Leu Val Thr Asn 195 200 205

Phe Gln Met Val Gln Phe Ala Phe Gly Met Gly Leu Gly Ala Ala Trp 210 215 220

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	_	gat Asp	_	-		-	_		-		_						672
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Leu Ser Lys Ile Leu Glu Phe Gly Asp Thr Ile Leu Ile Ile Leu Gly 130 135 140

Lys Ser Ile Gln Arg Leu Ser Phe Leu His Val Tyr His His Ala Thr 145 150 155 160

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Pro Ile Ala Leu Val Thr Asn Ser Thr Val His Val Ile Met Tyr Gly
180 185 190

Tyr Tyr Phe Leu Cys Ala Val Gly Ser Arg Pro Lys Trp Lys Arg Leu 195 200 205

Val Thr Asp Cys Gln Ile Val Gln Phe Val Phe Ser Phe Gly Leu Ser 210 . 215 220

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tca agt tat gac gag tat atc gtc atg gtc aac gac ctt ggc gac tct
                                                                          162
Ser Ser Tyr Asp Glu Tyr Ile Val Met Val Asn Asp Leu Gly Asp Ser
att ctg agc tgg gcc gac cct gat cac tat cgt gga cat acc gag gga
Ile Leu Ser Trp Ala Asp Pro Asp His Tyr Arg Gly His Thr Glu Gly
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                                      30
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Trp Glu Phe Thr Asp Phe Ser Ala Ala Phe Ser Ile Ala Val Ala Tyr
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His Thr Glu Gly Trp Glu Phe Thr Asp Phe Ser Ala Ala Phe Ser Ile 35 40 45

Ala Val Ala Tyr Leu Leu Phe Val Phe Val Gly Ser Leu Ile Met Ser 50 55 60

Met Gly Val Pro Ala Ile Asp Pro Tyr Pro Leu Lys Phe Val Tyr Asn 65 70 75 80

Val Ser Gln Ile Met Leu Cys Ala Tyr Met Thr Ile Glu Ala Ser Leu 85 90 95

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Phe Glu Lys Pro Pro Ile Ala Lys Leu Leu Trp Leu Phe Tyr Val Ser 115 120 125

Lys Ile Trp Asp Phe Trp Asp Thr Ile Phe Ile Val Leu Gly Lys Lys 130 135 140

Trp Arg Gln Leu Ser Phe Leu His Val Tyr His His Thr Thr Ile Phe 145 150 155 160

Leu Phe Tyr Trp Leu Asn Ala His Val Asn Phe Asp Gly Asp Ile Phe 165 170 175

Leu Thr Ile Val Leu Asn Gly Phe Ile His Thr Val Met Tyr Thr Tyr 180 185 190

Tyr Phe Ile Cys Met His Thr Lys Val Pro Glu Thr Gly Lys Ser Leu 195 200 205

Pro Ile Trp Trp Lys Ser Ser Leu Thr Ser Met Gln Leu Val Gln Phe 210 215 220

Ile Thr Met Met Thr Gln Ala Ile Met Ile Leu Tyr Lys Gly Cys Ala 225 230 235 240

Ala Pro His Ser Arg Val Val Thr Ser Tyr Leu Val Tyr Ile Leu Ser 245 250 255

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